

# **CAPTURE Software**

*QFD Matrix-Based Decision Making Tools  
for Microsoft Windows*

**DECISIONcapture & QFDcapture  
User's Manual**

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# Table of Contents

<b>TABLE OF CONTENTS .....</b>	<b>1</b>
<b>CHAPTER 1: WELCOME.....</b>	<b>7</b>
Technical Assistance .....	8
<b>CHAPTER 2: GETTING STARTED TUTORIAL.....</b>	<b>9</b>
Tutorial Project Background.....	10
Documenting the Project .....	11
Entering the WHATs .....	13
Entering the WHATs Importance Values .....	14
Entering the WHATs Satisfaction Ratings .....	15
Developing the Target Satisfaction Ratings .....	16
Prioritizing the WHATs.....	18
Viewing the QFD Chart.....	20
Sorting the WHATs .....	22
Developing the HOWs.....	23
Defining the Matrix Relationships.....	25
Prioritizing the HOWs .....	27
Sorting the HOWs .....	28
Defining Tradeoffs .....	29
Printing the QFD Chart.....	31
Setting Target Values .....	32
Creating QFD Chart Web Pages.....	33
<b>CHAPTER 3: ROADMAP HOW TO'S .....</b>	<b>35</b>
How to open a template file.....	35
How to add a list to the Roadmap.....	38
How to add a matrix to the Roadmap .....	39
How to move boxes on the Roadmap .....	40
How to move lines on the Roadmap.....	41
How to resize boxes on the Roadmap.....	43
How to print the Roadmap.....	44
How to create a web page of a Roadmap.....	44

**CHAPTER 4: LIST HOW TO'S.....46**

- How to create a list ..... 46
- How to change a list name ..... 47
- How to add entries to a list ..... 47
- How to create categories in a list ..... 48
- How to sort a list..... 50
- How to move list entries ..... 51
- How to delete list entries ..... 51
- How to exclude a list entry from charts ..... 53

**CHAPTER 5: RELATED DATA HOW TO'S .....55**

- How to add a related data entry ..... 55
- How to add notes to related data entries ..... 55
- How to clear related data entry names ..... 57
- How to change the name of a related data entry ..... 57
- How to cut related data entries ..... 58
- How to copy related data entries..... 58
- How to paste related data entries over existing data ..... 59
- How to paste related data entries as inserted entries..... 59
- How to move related data entries ..... 60
- How to edit properties of a related data entry ..... 60
- How to change the data type of a related data entry ..... 62
- How to setup a calculation..... 63
- How to setup a graph ..... 64
- How to select a set of symbols for a related data entry..... 66
- How to setup symbols for a related data entry ..... 67
- How to exclude a related data entry from charts ..... 70

**CHAPTER 6: MATRIX HOW TO'S.....72**

- How to create a matrix..... 72
- How to create a roof matrix ..... 73
- How to add matrix relationships in the spreadsheet view ..... 74
- How to add matrix relationships in the tree view ..... 75
- How to delete a matrix relationship in the spreadsheet view ..... 76
- How to delete a matrix relationship in the tree view ..... 77
- How to select a set of relationship symbols for a matrix ..... 78
- How to create a custom symbol set ..... 78

<b>CHAPTER 7: CHART HOW TO'S.....</b>	<b>81</b>
How to view a chart.....	81
How to print a chart.....	83
How to create a web page of a chart.....	84
How to include a chart in another document.....	87
How to specify which data areas to include in a chart.....	87
How to add calculation to chart.....	88
How to add graph to chart.....	88
How to set foreground and background colors of rows or columns.....	89
How to zoom in or out of a chart.....	90
<b>CHAPTER 8: GENERAL HOW TO'S.....</b>	<b>91</b>
How to spell check your text.....	91
How to set general software preferences.....	92
<b>CHAPTER 9: ADVANCED FEATURES.....</b>	<b>98</b>
How to create a market opportunity map.....	98
How to create a tree diagram.....	103
How to generate a customer survey.....	107
How to merge results from team members.....	111
How to provide an audit trail for data.....	116
<b>CHAPTER 10: CALCULATION REFERENCE.....</b>	<b>118</b>
Add.....	118
Average.....	119
Concept Selection Score.....	121
Divide.....	122
Maximum.....	123
Minimum.....	125
Multiply.....	126
Percent.....	127
Percent Change.....	129
Rank.....	131
Rate.....	132
Subtract.....	134
Sum of Correlation Values.....	136
Sum of Minuses.....	138

Sum of Pluses .....	140
Sum of Sames .....	142
Technical Importance (Absolute Value).....	144
Technical Importance (Ideal).....	146
Technical Importance (Proportional or Normalized).....	148
Technical Importance (Standard).....	150
Weighted Average .....	152
User Defined Calculations .....	154
<b>CHAPTER 11: TROUBLESHOOTING .....</b>	<b>156</b>
"Not enough free disk space" message during installation .....	156
"Undefined Error" message .....	157
"Error loading from file" message .....	158
<b>CHAPTER 12: THE BASICS OF QFD.....</b>	<b>159</b>
What is QFD?.....	159
Why use QFD? .....	159
What are some approaches to QFD?.....	160
What are the basic tools of QFD?.....	163
<b>CHAPTER 13: CAPTURING MARKET DATA .....</b>	<b>164</b>
How do we define Customers?.....	164
How do we capture our Customers' Requirements? .....	165
How do we capture Importance to the Customers? .....	166
How do we capture the Customers' Perceptions of Performance?.....	166
How do we capture Customer Satisfaction Data?.....	167
<b>CHAPTER 14: PRIORITIZING REQUIREMENTS.....</b>	<b>168</b>
What should we use to prioritize Requirements?.....	168
How should we define our Strategy?.....	171
How should we include our Sales Factors? .....	172
What does this information tell us? .....	173
<b>CHAPTER 15: MEASURING THE DESIGN .....</b>	<b>175</b>
Why define Design Measures?.....	175
How should we define our Design Measures?.....	177
What other information can we relate to Customer Requirements? .....	177

<b>CHAPTER 16: DEFINING RELATIONSHIPS.....</b>	<b>179</b>
Why define Relationships between Lists? .....	179
How can Relationships be defined?.....	179
What scales should we use?.....	180
<b>CHAPTER 17: IDENTIFYING TRADEOFFS .....</b>	<b>182</b>
Why evaluate Tradeoffs? .....	182
How should we evaluate Tradeoffs?.....	182
How should we document Actions? .....	182
<b>CHAPTER 18: BENCHMARKING .....</b>	<b>184</b>
Why Benchmark? .....	184
Who should we Benchmark? .....	185
How do we capture the results of Benchmarking? .....	185
<b>CHAPTER 19: SETTING TARGET VALUES.....</b>	<b>187</b>
How should we set our Target Values? .....	187
<b>CHAPTER 20: DESIGN CONCEPTS.....</b>	<b>189</b>
Why evaluate Alternative Concepts?.....	189
How do we develop Alternative Concepts?.....	189
How should we choose the best Concept?.....	191
<b>CHAPTER 21: DEFINING ACTIONS .....</b>	<b>193</b>
What should we do as the result of this QFD project?.....	193
<b>CHAPTER 22: GLOSSARY OF TERMS.....</b>	<b>194</b>
Characteristics .....	194
Chart .....	194
Concept Selection .....	194
Critical to Quality .....	194
Decision Criteria.....	194
Decision Measures.....	194
House of Quality.....	195
HOWs .....	195
Input List .....	195
List.....	195

List Entry .....	195
Matrix .....	195
Output List .....	196
QFD .....	196
Related Data Entry.....	196
Relationship .....	196
Relationship Tree.....	197
Requirements .....	197
Roadmap .....	197
Roof .....	197
Six Sigma Process .....	197
Template .....	198
Weighting Factor .....	198
WHATs.....	198
<b>INDEX.....</b>	<b>200</b>

# Chapter 1: Welcome

The success of your Product or Service depends on how well it addresses the wants and needs of your customers – both internal and external. Successful application of Quality Function Deployment (QFD) demands that these requirements be carefully managed as they are prioritized, analyzed and translated throughout the process. The Capture family of QFD software tools facilitates these goals. It's support for any decision-making process – from basic to complex – makes this software an indispensable tool. It is designed to support the data management, calculation, analysis, and report generation needs of the QFD process.

This manual provides information that will allow you to get the fullest benefit from your Capture software. It is divided into the following sections:

- **Tutorial**  
This section includes step by step instructions for completing a basic QFD project using the Capture software. Each step of the QFD process is paired with the corresponding software operations that you can use to complete that step.
- **"How To" Section**  
This section provides step by step instructions for accomplishing specific tasks with the Capture software.
- **TroubleShooting**  
This section describes the possible causes and workarounds for error messages that you may see when using the Capture software.
- **QFD Basics**  
This section describes some common steps of the Quality Function Deployment process in detail along with rationale and benefits of each step.
- **Glossary of Terms**  
This section provides definitions of the terms found throughout the documentation.

In addition to the Table of Contents, there is a complete Index at the end of this book that will help to locate the answers that you are looking for.

## **Technical Assistance**

An online version of this manual can be found on the QFDcapture and DECISIONcapture websites. It contains fully searchable and indexed contents. You can access this online help at:

- <http://www.qfdcapture.com/WebHelp/CaptureOnlineHelp.htm>

and

- <http://www.decisioncapture.com/WebHelp/CaptureOnlineHelp.htm>

If you cannot find the information that you are looking for in this manual or the online help, you can contact our technical support department via email. Please be sure to include: the product name, product version number, and a description of the problem or question. The Capture Products Technical Support email address is:

- [qfdhelp@iti-oh.com](mailto:qfdhelp@iti-oh.com)

## Chapter 2: Getting Started Tutorial

This section is a tutorial that will describe the steps that you can follow using your Capture software to accomplish the tasks involved in a typical QFD project. By following the topics in this section, you should become familiar with:

- Operations used to accomplish the basic tasks of a QFD project
- Windows that are used to enter and view your project information

You may want to first read through the Glossary section in order to become familiar with the terminology that will be used throughout this documentation.

## **Tutorial Project Background**

This tutorial will use data from a fictitious project to design a new pen. Here is the background information for the project.

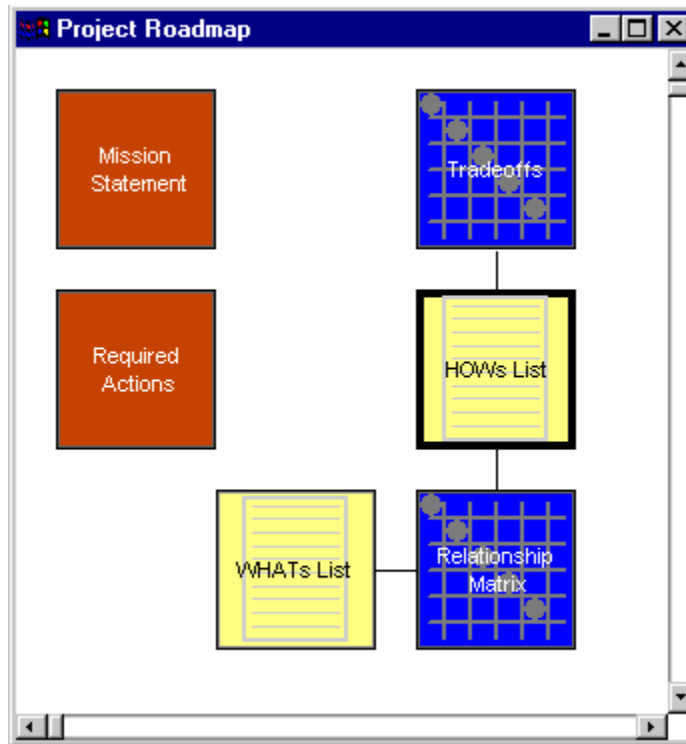
You and your team at Pens Inc. have been charged with designing a new pen. The goals of the design project are:

- To become the market leader in the Primary and Secondary Student market segment
- To improve the quality perception of Pens Inc. pens

You decide that QFD is the ideal process for reaching these goals. The project goals need to be documented and easily accessible at all times so that the team can stay on track to meet them. You can use Capture software to accomplish this.

To start your Capture software, select Start-Programs-QFD Capture (Decision Capture) from the Windows menu.

You will be presented with a Roadmap showing the blocks of information involved in a common QFD project. The Roadmap is a navigation tool that allows you to quickly access a specific set of information by double clicking on the block representing that data.

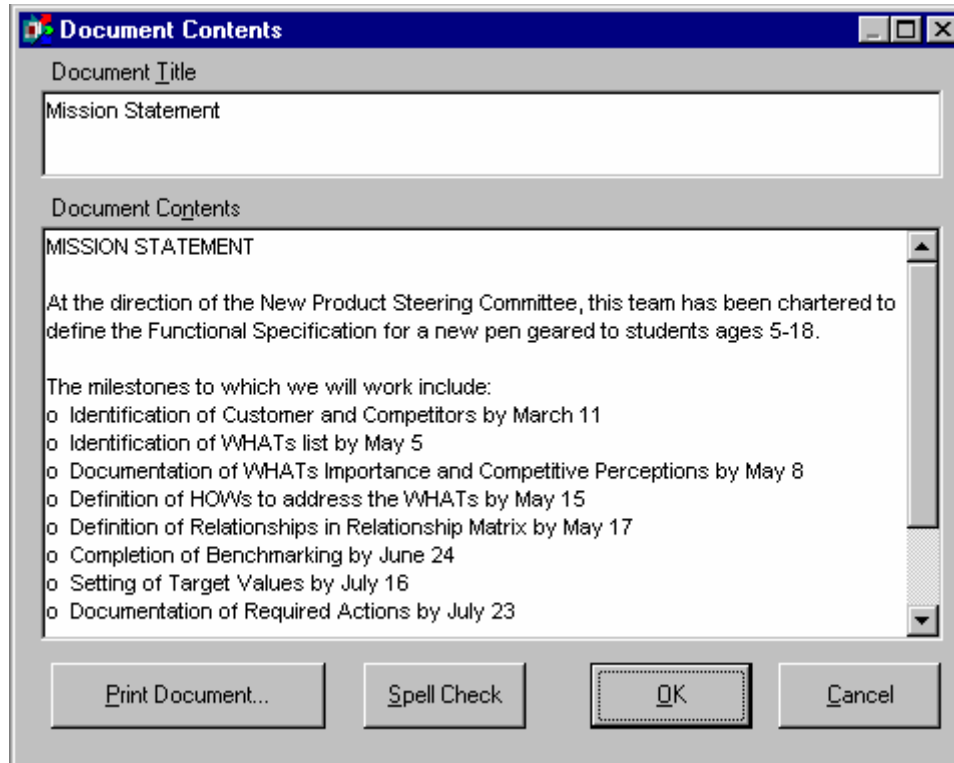


Roadmap Window

## Documenting the Project

To enter the Project Goals and Mission Statement into the project:

- Double-click on the Mission Statement block in the Roadmap.
- Type in a sponsor name, product name (“New and Nifty Pen”), and target dates for each milestone.



Document Window

To print out the Mission Statement - in order to share it with team members and with your sponsor:

- Double-click on the Document block in the Roadmap
- Click on the Print Document button
- Click on the OK button in the resulting Print dialog box

---

## Entering the WHATs

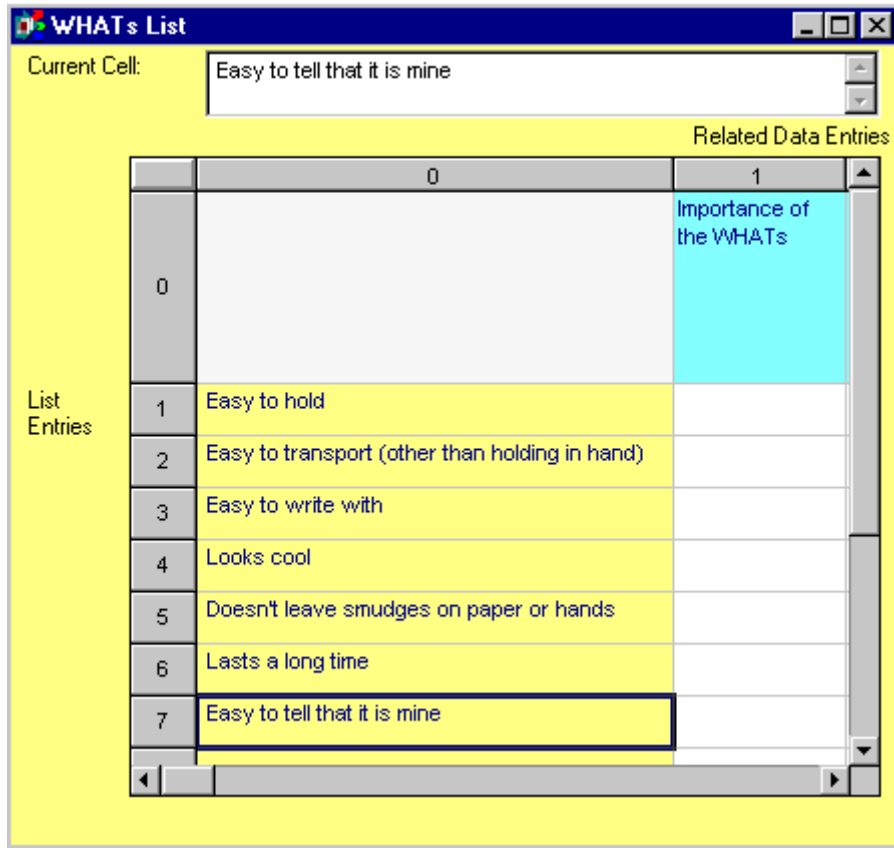
Your team has determined that you need to collect the following information from your target market group (students ages 5 through 18) to go forward with your project:

- Customer requirements for pens
- Satisfaction ratings for your current pen and for your top two competitors' pens

A team member is selected to manage the collection of this information. The next meeting is scheduled for a time when the data should be available.

When the team reconvenes, it is time to enter the customer requirements into the WHATs list. To do this:

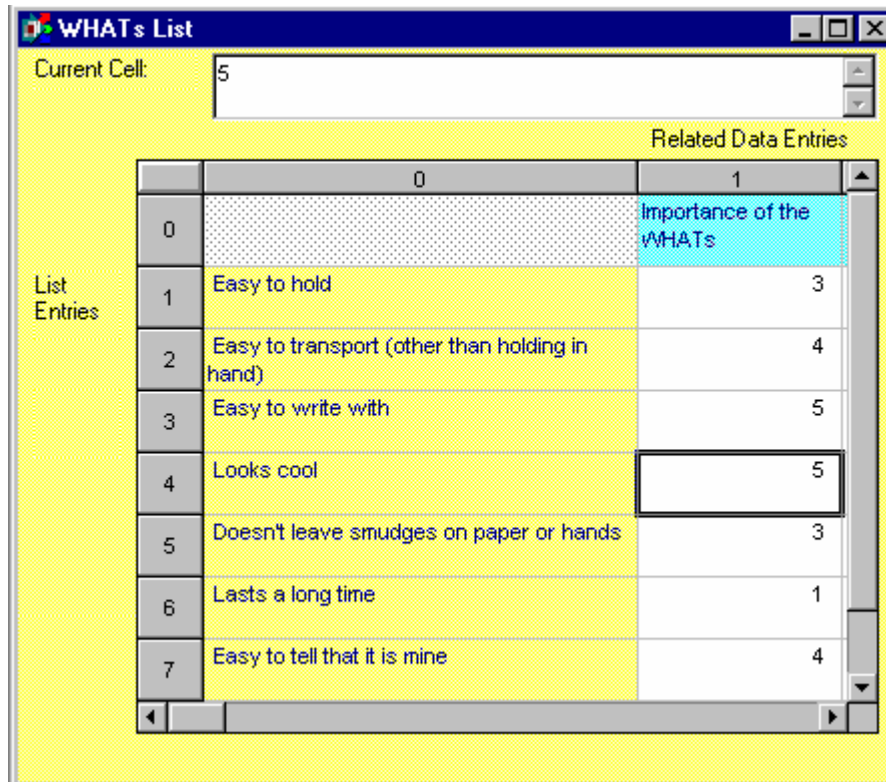
- Double-click on the WHATs List block in the Roadmap.
- Type the customer requirements from your marketing data into the first column of the spreadsheet. (See the following picture.)
- Press the Enter key after typing in each entry. This will move the cursor down to the next entry row.



## Entering the WHATs Importance Values

Enter the Importance values that you have gathered for the requirements into Column #1, under the “Importance of the WHATs” heading. To do this:

- Click in the Importance column cell for row 1.
- Type in the correct importance value from the marketing data shown on the next page. (See the following picture.)
- Press the down-arrow key to move down to the next cell.



## Entering the WHATs Satisfaction Ratings

You will now enter the customer satisfaction ratings that you have gathered for the requirements into the spreadsheet.

- Click in the cell labeled "Our Current Product".
- In the Current Cell area at the top of the window, select the word "Product" and type in the word "Pen".

Now fill the data into columns labeled "Our Current Pen", "Competitor 1" and "Competitor 2". To do this:

- Click in the appropriate cell.
- Type in the correct rating value from the marketing data on the next page.

		0	3	4	5
			Our Current Pen	Competitor 1	Competitor 2
List Entries	1	Easy to hold	4	3	3
	2	Easy to transport (other than holding in hand)	3	2	3
	3	Easy to write with	4	3	4
	4	Looks cool	1	2	2
	5	Doesn't leave smudges on paper or hands	2	4	3
	6	Lasts a long time	3	4	5
	7	Easy to tell that it is mine	1	1	1

## Developing the Target Satisfaction Ratings

The next step is to decide on what your satisfaction targets will be for each WHAT. Your team will make a subjective decision for each WHAT based on:

- Importance of the WHAT
- Current Pen satisfaction rating
- Competitors' satisfaction ratings

For example, if your current product rates a low satisfaction score, your

competitors have higher scores and the WHAT is very important, you might decide to strive to meet or beat the best competitor's rating. If your current product rates the highest among your competitors and the WHAT is not very important, then you might set the target the same as the current rating (no improvement is necessary).

Now fill the data into the column labeled "Our Future Product". To do this:

- Click in the appropriate cell.
- Type in the target value from the data below.

		0	6
			Our Future Product
0			
1	Easy to hold		4
2	Easy to transport (other than holding in hand)		4
3	Easy to write with		5
4	Looks cool		4
5	Doesn't leave smudges on paper or hands		3
6	Lasts a long time		3
7	Easy to tell that it is mine		3

## Prioritizing the WHATs

Now that the market data has been entered into the project, the WHATs can be prioritized. There are several ways to do this. The method that you select depends upon the goals of the project:

- To base the priorities solely on the customer priorities, the WHATs can be prioritized by the “Importance to the Customer”.
- To incorporate an emphasis on the level of improvement needed when upgrading an existing product or service, the WHATs can be prioritized using the “Importance to the Customer” multiplied by the “Improvement Factor”.

In this case you will use the combined prioritization factors since you are trying to improve the quality perception of the product. The “Overall Importance” column has already been setup to multiply the two factors together. See the data in the following chart.

Relationship Matrix

### New Pen Product Planning Matrix

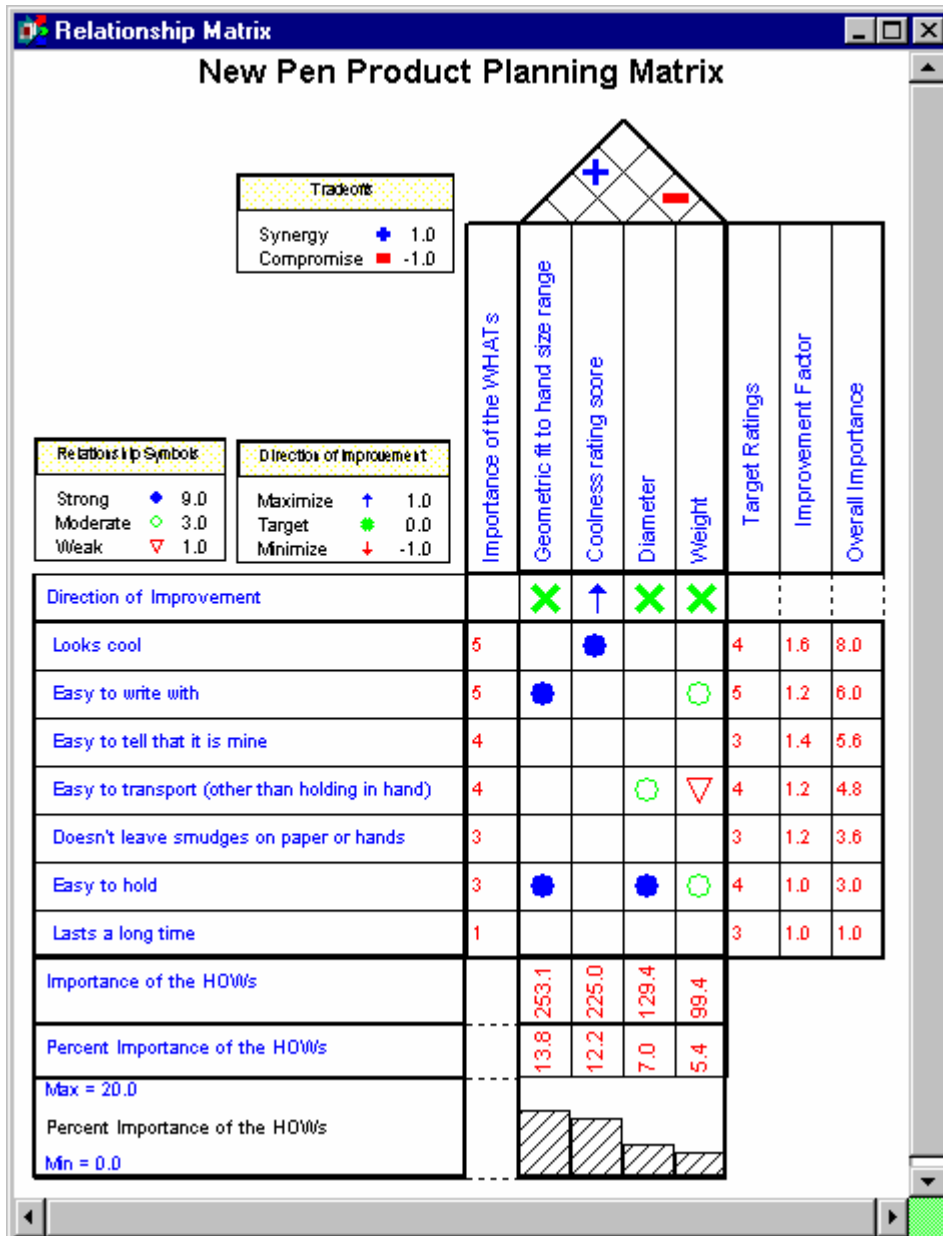
	Importance of the WHAT's	Competitive Analysis	Our Current Pen	Competitor 1	Competitor 2	Target Ratings	Improvement Factor	Overall Importance	Percent Importance	Min = 0.0	Percent Importance	Max = 30.0
Easy to hold	3		4	3	3	4	1.0	3.0	9.4			
Easy to transport (other than holding in hand)	4		3	2	3	4	1.2	4.8	15.0			
Easy to write with	5		4	3	4	5	1.2	6.0	18.8			
Looks cool	5		1	2	2	4	1.6	8.0	25.0			
Doesn't leave smudges on paper or hands	3		2	4	3	3	1.2	3.6	11.3			
Lasts a long time	1		3	4	5	3	1.0	1.0	3.1			
Easy to tell that it is mine	4		1	1	1	3	1.4	5.6	17.5			

## Viewing the QFD Chart

To view your results at this point:

- Double-click on the Relationship Matrix block in the Roadmap
- Select View-As Chart from the menubar

The QFD chart for your project will be shown. The rows should contain your WHATs. The columns at the far right should contain the data that you entered for prioritizing the WHATs. Notice the calculated Overall Importance column on the far right. The calculation was already setup for you in the template file.



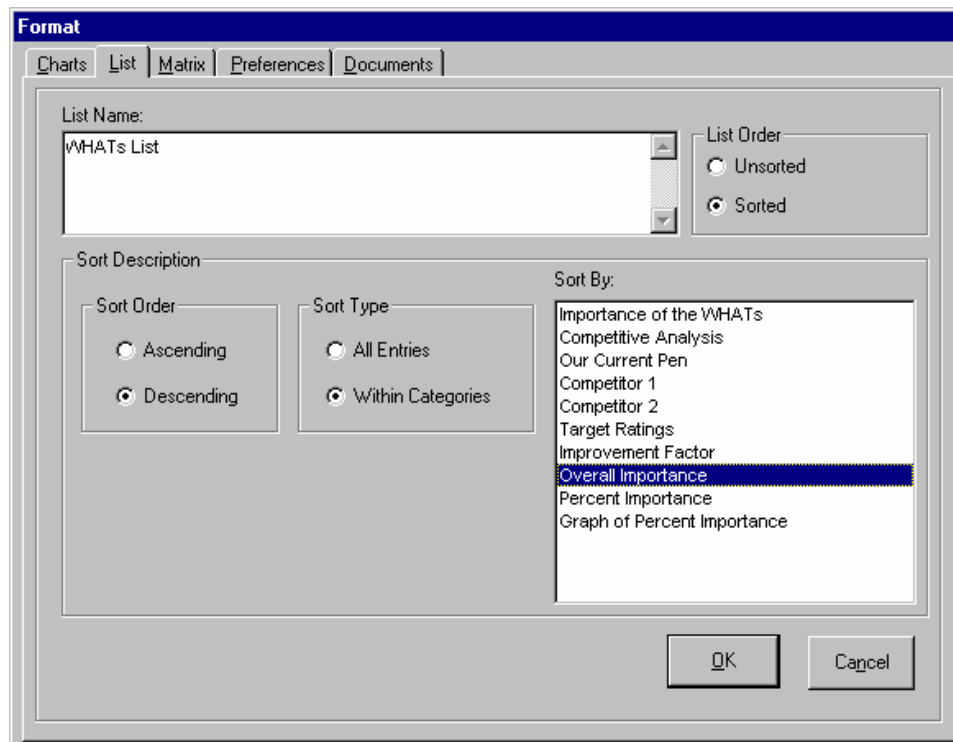
Now we can sort the WHATs list in order of the Overall Importance to get a good picture of the relative importance of the customer requirements.

## Sorting the WHATs

To sort the WHATs list:

- Select Window-Project Roadmap (Decision Roadmap for DECISIONcapture) from the menubar to get back to the Roadmap window
- Double-click on the WHATs list block in the Roadmap
- Select Tools-Sort from the menubar
- Click on “Overall Importance” in the Sort By list
- Click on the OK button

Notice that the word “Sorted” appears in the title bar of the window. To see the sorted results in the chart, bring up the Relationship Matrix window. You can do this by selecting Window-Relationship Matrix from the menubar.



## Developing the HOWs

Now it is time for you and your team to translate the WHATs into the language of your organization, sometimes called the HOWs. In this project the HOWs will be the characteristics of the new pen.

You will look at each customer requirement and determine one or more characteristics of the new pen that – if closely measured and controlled – would help to assure meeting that requirement.

To enter the HOWs into the Project:

- Double-click on the HOWs List block in the Roadmap
- Type the characteristics from the list below into the first column of the spreadsheet

Current Cell: Impact resistance of pen

Related Data Entries

	0	1
0		Direction of Improvement
1	Diameter	
2	Length	
3	Coefficient of friction	
4	Weight	
5	Geometric fit to hand size range	
6	Coolness rating score	
7	Number of innovative appearance features	
8	Ink storage capacity	
9	Flow rate of ink	
10	Drying rate of ink	
11	Number of ways to customize appearance	
12	Number ways of transporting pen	
13	Impact resistance of pen	

List Entries

---

## Defining the Matrix Relationships

The matrix relationships are used to translate the priorities of the WHATs into priorities of the HOWs. To determine whether or not a relationship should exist between a WHAT row and a HOW column, evaluate one of the following questions:

- To what degree does this HOW predict customer satisfaction with this WHAT?
- If we do a good job controlling this HOW, how certain are we that this WHAT will be satisfied?

To insure consistency, use the same question to evaluate all of the relationships in the matrix.

- If the HOW is a strong predictor or provides a high level of certainty, then a “Strong” relationship should be assigned.
- If the HOW is a moderate predictor or provides a moderate level of certainty, then a “Moderate” relationship should be assigned.
- If the HOW is a weak predictor or provides a small level of certainty, then a “Weak” relationship should be assigned.
- If there is no connection between the HOW and the WHAT, then leave the cell empty.

To enter a relationship into the matrix:

- Double-click on the Relationship Matrix block in the Roadmap
- If the current view is not a spreadsheet, select View-As Spreadsheet from the menubar
- Click in the cell location where you want to create a relationship

- Click on the desired relationship symbol in the Available Symbols window

or

- Type in the numeric value of the relationship

Note: Each relationship symbol has a number associated with it. These numeric values are used in the mathematical translation of the Importance of the WHATs into the Importance of the HOWs.

You can also move from cell to cell using the arrow keys. If the WHAT or HOW that you are working with is not visible in the spreadsheet, use the scrollbars to bring it into view.

The screenshot shows a window titled "Relationship Matrix" with a "Current Cell" field set to "Easy to hold". Below is a grid with columns 0-3 and rows 0-5. The grid contains relationship symbols (dots and circles) indicating connections between WHATs and HOWs.

	0	1	2	3
0		Diameter	Length	Coefficient of friction
1	Easy to hold	●	○	●
2	Easy to transport (other than holding in hand)	○	○	
3	Easy to write with			
4	Looks cool			
5	Doesn't leave smudges on paper or hands			

## Prioritizing the HOWs

To view your results at this point, select View-As Chart from the menubar. At the bottom of the chart you will see that there are values in the “Importance of HOWs” row. These values are the result of a calculation in the template that multiplies the “Overall Importance” of the WHATs by the relationship values in the center of the matrix and sums down each column. This results in the translation of priorities of the WHATs into priorities of the HOWs.

**Relationship Matrix**

**New Pen Product Planning Matrix**

**Direction of Improvement**

Maximize	↑	1.0
Target	●	0.0
Minimize	↓	-1.0

**Relationship Symbols**

Strong	◆	9.0
Moderate	◇	3.0
Weak	▽	1.0

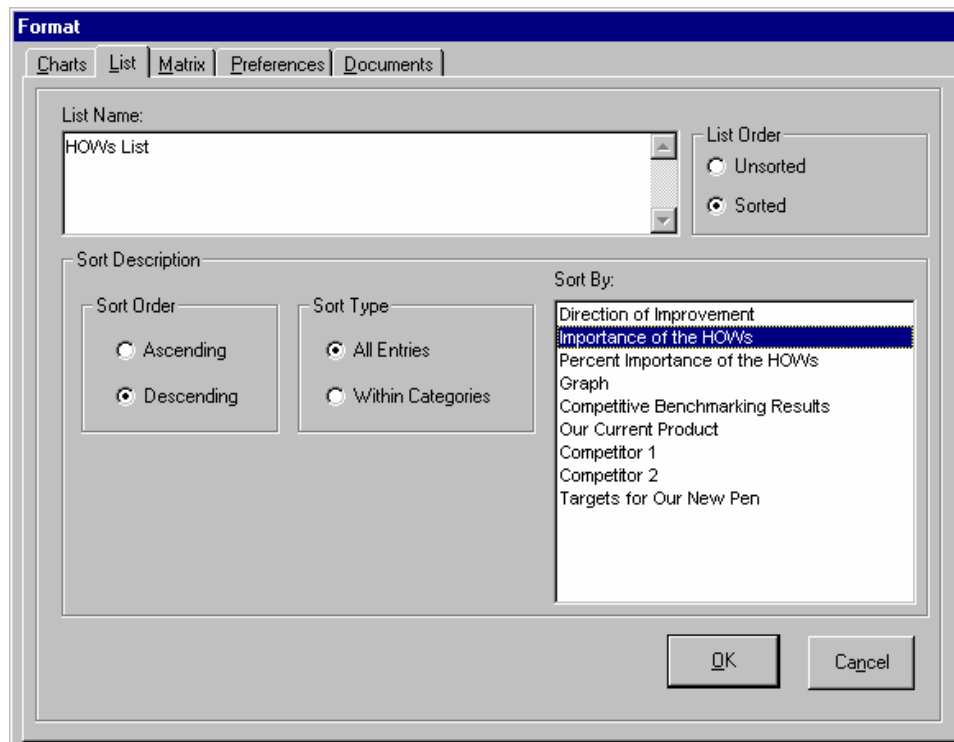
	Percent Importance	Diameter	Length	Coefficient of friction	Weight	Geometric fit to hand size range
Direction of Improvement		×	×	×	×	×
Easy to hold	9.4	◆	◇	◆	◇	◆
Easy to transport (other than holding in hand)	15.0	◇	◇		▽	
Easy to write with	18.8				◇	◆
Looks cool	25.0					
Doesn't leave smudges on paper or hands	11.3					
Lasts a long time	3.1					
Easy to tell that it is mine	17.5					
Importance of the HOWs		129.4	73.1	84.4	99.4	253.1

## Sorting the HOWs

To sort the HOWs list from most important to least important:

- Select Window-Roadmap from the menubar to get back to the Roadmap window
- Double-click on the HOWs list block in the Roadmap
- Select Tools-Sort from the menubar
- Click on “Importance of the HOWs” in the Sort By list
- Click on the OK button

Notice that the word “Sorted” appears in the title bar of the window. To see the sorted results in the chart, bring up the Relationship Matrix window. You can do this by selecting Window-Relationship Matrix from the menubar.



## Defining Tradeoffs

In order to properly set target values for the HOWs, it is necessary to determine what impact, if any, the implementation of each HOW would have on each of the other HOWs. If the implementation of one HOW would negatively affect the ability to implement another HOW, then there will be a “tradeoff” decision to be made. You will not be able to completely optimize one without negatively affecting the other. The “roof” of the QFD matrix shows where these tradeoffs exist and to what level.

To enter the tradeoff relationships into the project:

- Double-click on the Tradeoffs block in the Roadmap
- If the current view is not a spreadsheet, select View-As Spreadsheet from the menubar
- Click in the cell location where you want to create a tradeoff relationship
- Click on the desired relationship symbol in the Available Symbols window

In this project you have a choice of “Positive” meaning a positive impact or “Negative” meaning a negative impact. Some projects require more differentiation, so four levels of relationship are used: Strong Positive, Positive, Negative and Strong Negative.

The screenshot shows the 'Tradeoffs' window with a spreadsheet. The 'Current Cell' is B1, containing the value -1. The spreadsheet has columns 0, 4, 5, 6, and 7. The rows are labeled 0 through 10. The 'Available Symbols' window is open, showing three options: Synergy (+), Compromise (-), and Clear Value.

	0	4	5	6	7
0		Weight	Geometric fit to hand size range	Coolness rating score	Number of innovative appearance features
1	Diameter	-	+		
2	Length	-	+		
3	Coefficient of friction				
4	Weight				
5	Geometric fit to hand size				
6	Coolness rating score				+
7	Number of innovative appearance features				
8	Ink storage capacity	-			
9	Flow rate of ink				
10	Drying rate of ink				

Available Symbols		
Synergy	+	1.00
Compromise	-	-1.00
Clear Value		

---

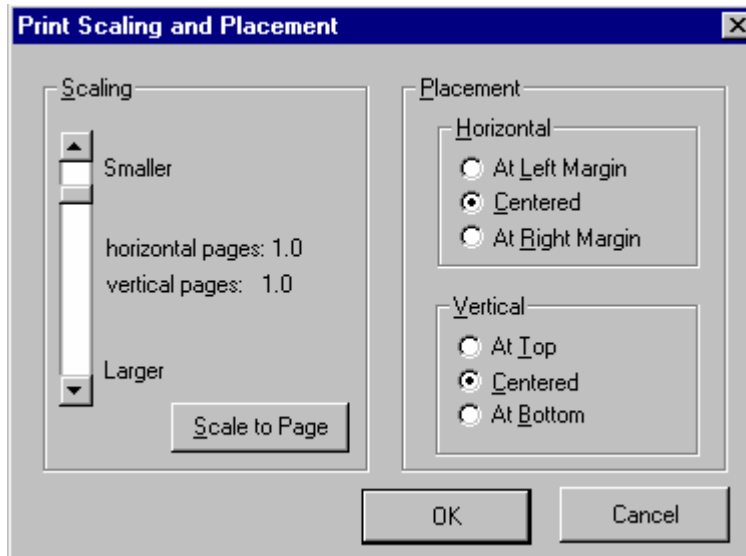
## Printing the QFD Chart

To print the QFD chart:

- Double-click on the Relationship Matrix block in the Roadmap to open the Matrix window
- Select View-As Chart from the menubar
- Select File-Print-To Printer from the menubar
- Click on the OK button in the Print dialog box
- Click on the OK button in the Print Scaling and Placement dialog box

If you don't change the Scaling, the QFD chart will scale to fit one printed page. Note that the chart will be scaled to whatever page size you are printing to. For example, if you print to an E size plotter the chart will fill the E-size width.

If you slide the scale toward "Smaller", the chart will fill less than the full page. If you slide the scale toward "Larger", the chart will span multiple pages. This would be used to make larger charts more readable when printing to a small paper size.



## Setting Target Values

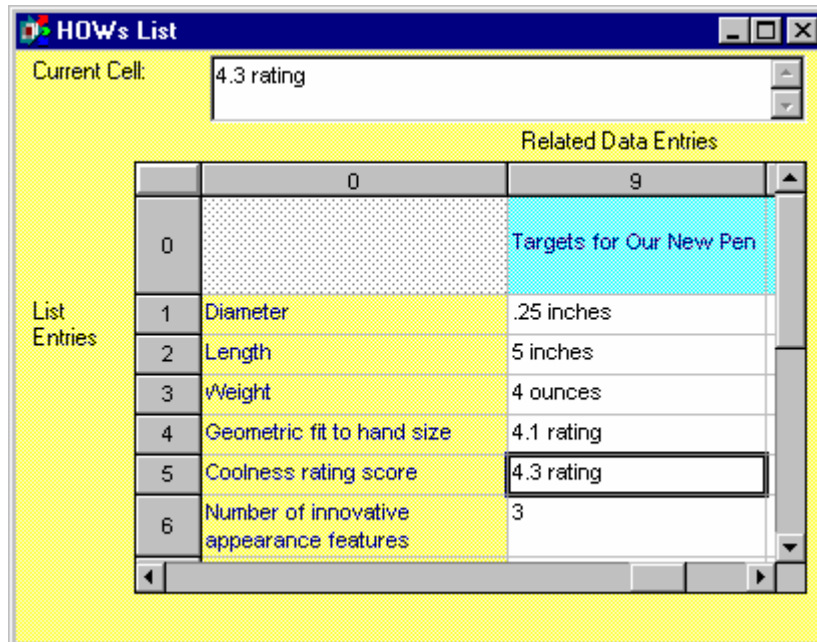
The QFD chart that you have completed to this level provides much of the information that you will need to set target values for the HOWs. The information that you may want to consider when setting a target value is:

- Priority level of the HOW (“Importance of HOWS” row in this example)
- Tradeoffs that exist with other HOWs (found in the roof of the matrix)
- Benchmark results for the HOW (“Benchmark Results” rows in this example)
- Direction of optimization of the HOW (“Direction of Improvement” row in this example)

To enter a target value into the project:

- Double-click on the HOWs list block in the Roadmap
- Click in the “Target Value” cell for the desired HOW

- Type in the target value that you have decided on. You can include units or any other text that helps to describe the target.



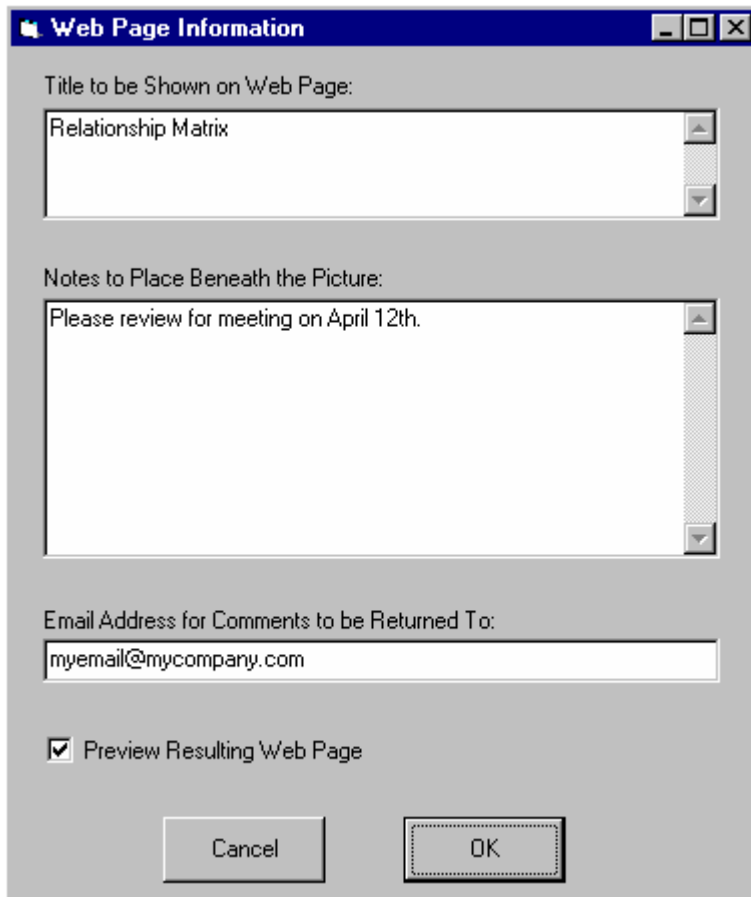
## Creating QFD Chart Web Pages

Now you need to share the findings of your team with the rest of your organization. One way to do this is to save the QFD chart as a web page (HTML file). To do this:

- Double-click on the Relationship Matrix block in the Roadmap
- Select View-As Chart from the menubar
- Select File-Export Graphics from the menubar
- Select "Web Page (\*.HTM)" in the "Save As Type" list
- Type in a name for the file and click on the Save button

The Web Page Information dialog box that appears allows you to add the following information to the web page:

- Title that will be shown at the top of the web page
- Notes that will be placed beneath the QFD chart on the web page
- Email link that others can click on to send comments



## Chapter 3: Roadmap How To's

### How to open a template file

Template files provide a starting point for your projects. They contain a structure that includes blank rows and columns, calculations, graphs and links between matrices. There are many templates that were installed with your Capture software. If none of these are a close enough fit with your project, you can also create your own templates.

To open a template file:

- Select the File - Open menu option
- Select Template Files (\*.TPL) from the "Files of Type" drop down list in the Open dialog box
- Locate the desired Template file

The templates distributed with your Capture software are located in the "Template" subdirectory under the directory where QFDcapture or DECISIONcapture was installed.

The "Simple" template (called SIMPLE.TPL) includes a single QFD decision matrix that can be used to develop and prioritize one list of decision outcomes - based on one list of decision criteria. This is a generic template that can be used as a starting point for simple decisions that do not involve selecting from a set of options.

The following Template files are included with QFDcapture and DECISIONcapture Standard Edition:

- CPPDQFD.TPL - Based on the ITI Concurrent Engineering approach to product definition
- EQFD.TPL - Based on Don Clausing's Enhanced QFD as described in "Total Quality Development" from ASME Press
- FOURPHAS.TPL - Based on a four-phase approach to QFD
- GOAL.TPL - Based on the GOAL/QPC Matrix of Matrices approach as described in "Facilitating QFD" from GOAL/QPC

The following Template files are included with both the Basic and Standard Editions of DECISIONcapture:

- SELECT-FROM-OPTIONS.TPL - Provides a single decision matrix used to select the best option from a number of options that are available to you. This is a generic template that can be used as a starting point for simple decisions that involve selecting from a set of options.
- SELECT-PRODUCT.TPL - Provides a single decision matrix used to select the best product from a number of different products that are available. There is also a sample file based on this template which has been filled in with sample information. It is called SELECT-PRODUCT.MD3 and is located in the Sample sub-directory.

- **JOB.TPL** - Provides a single decision matrix used to select the best job from a number of jobs. There is also a sample file based on this template which has been filled in with sample information. It is called **JOB.MD3** and is located in the Sample sub-directory.
- **COLLEGE.TPL** - Provides a single decision matrix used to select the best college from a number of colleges. There is also a sample file based on this template which has been filled in with sample information. It is called **COLLEGE.MD3** and is located in the Sample sub-directory.

Other template files may be provided with each software upgrade. Please check the **README.TXT** file on the distribution disk, if one exists, for a complete description of any template files that may have been provided.

When you open a Template file, it is opened as “**UNNAMED.MD3**”. This helps to protect the original Template file from being overwritten with project data.

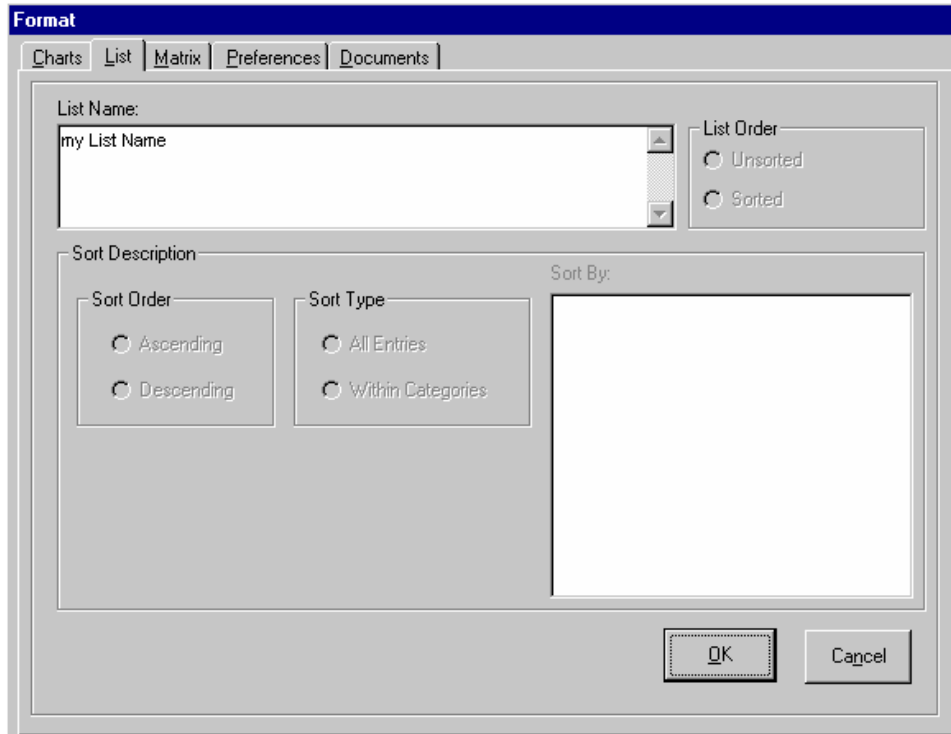
## How to add a list to the Roadmap

To add a new List to the Roadmap:

- Select the Create - List menu option

or

- Right-click on the Roadmap window background and select Create List from the pop-up menu



This menu option will open the List tab of the Format dialog box. The List tab allows you to define the List Name and the Sort characteristics of the List. At this time, you simply need to define the List Name. The optional sort characteristics can be defined after the List Entries and Related Data Entries have been entered.

## How to add a matrix to the Roadmap

To add a new Matrix to the Roadmap:

- Select the Create - Matrix menu option

or

- Right-click on the Roadmap window background and select Create Matrix from the pop-up menu

**Format**

Charts | List | **Matrix** | Preferences | Documents

Matrix Name: Relationship Matrix View: As Spreadsheet

Input List(s) to form rows: WHATs List, HOWs List

Output List(s) to form columns: WHATs List, HOWs List

Symbol Set: Standard 9-3-1 [Delete Symbol Set] [Delete Row]

Label	Symbol	Color	Value
Strong	●	Blue	9.00
Moderate	○	Green	3.00
Weak	▽	Red	1.00

Relationship Data Format: Integer [Rooms in Chart...] [OK] [Cancel]

The initial Matrix Name is “Unnamed Matrix”. Enter the desired Matrix Name.

A Matrix is formed by setting up one List as the rows of the Matrix (called the Input List) with another List as the columns of the Matrix (called the Output List). At least one Input List and one Output List must be selected. There can be multiple Lists forming the rows and/or columns of a Matrix.

The same List can be selected as both the Input List and Output List. This would create a "Roof Matrix" or "Tradeoff Matrix". This type of matrix is used to evaluate whether or not there will need to be tradeoffs between the decision outputs. It is important to know whether the decision outputs will negatively impact each other.

Select the desired Input List (or Lists) and Output List by clicking on the desired List Names.

Note: Multiple Input Lists can be selected. The Shift key is used to select consecutive Input Lists. The Ctrl key is used to select non-consecutive Input Lists. If there are multiple Input Lists, they will be concatenated.

After you have made all of your Matrix setup selections, click on the OK button. The Format dialog box will close and you will see the resulting Matrix window. A box representing the new Matrix will also be shown on the Roadmap.

## **How to move boxes on the Roadmap**

To move any of the boxes on the Roadmap to a new location:

- Click on the desired box and drag the box to the desired location on the window. (The lines of input and output between the Lists and Matrices will be maintained.)

The boxes can be located based on an invisible grid when you move them. To use this grid feature:

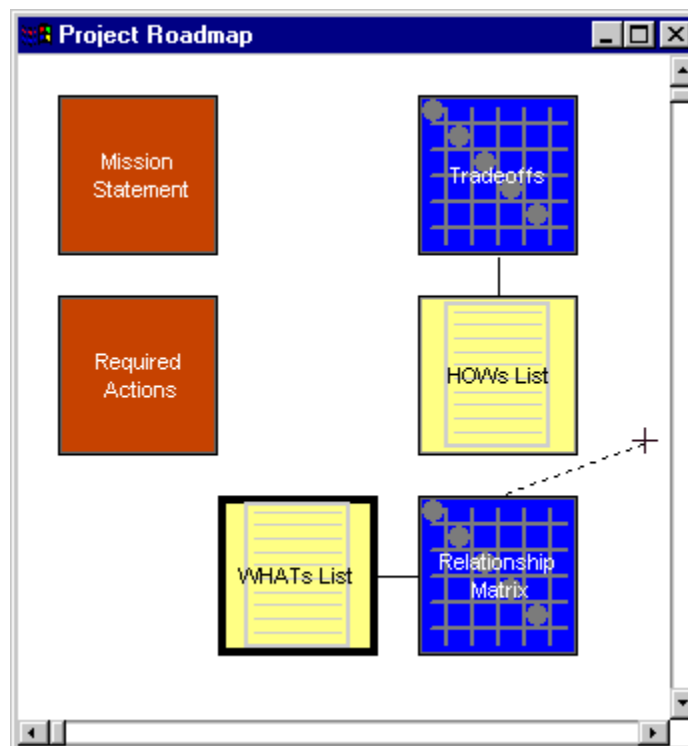
- Hold the Shift key down while dragging a box to a new location. The box will be snapped to one of several evenly spaced locations.

As you drag boxes with the Shift key, they will automatically "line up" with other "grid-ed" boxes. The same operation can be used for moving bends of lines to a grid location.

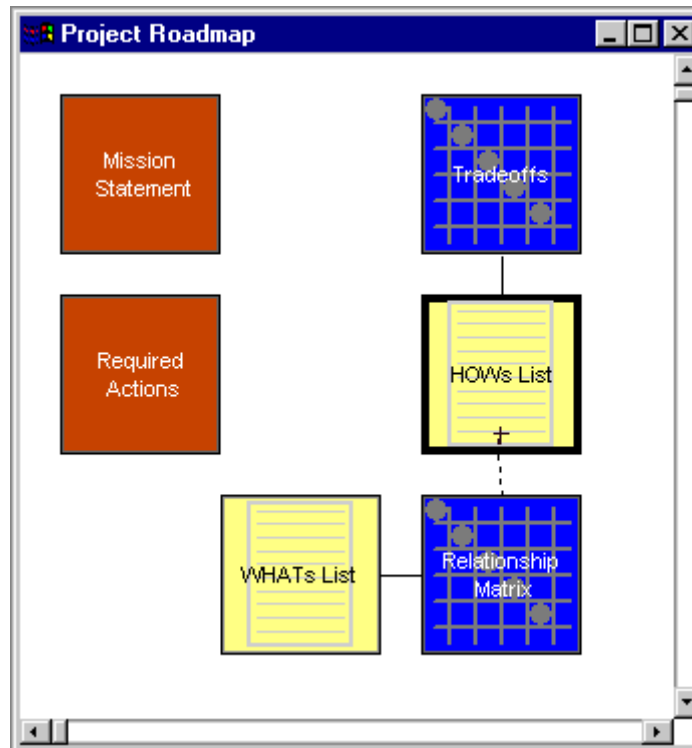
## How to move lines on the Roadmap

The end points of the lines connecting boxes on the Roadmap are connected to one of the four sides of each List or Matrix box. To modify the location of an end point:

- Press the Alt key on the keyboard and click on the desired end point of the line. That line will become dashed. Release the Alt key. Drag the end point to the desired side of the destination box and release the mouse button. The line will then return to a solid format.



Line appears dashed after holding the Alt key and clicking on the line



Click on the desired side of the box to leave the line attached to that side.

To insert a bend into a connector line:

- Press the Ctrl key on the keyboard and click on the desired location on the line. This creates a pivot point in the line. The line will become dashed. Release the Ctrl key. Drag the pivot point to the desired location and release the mouse button. The line will then return to a solid format.

To move the location of a bend in a line, drag the bend to a new location using the mouse. (It is not necessary to first press the Ctrl key.)

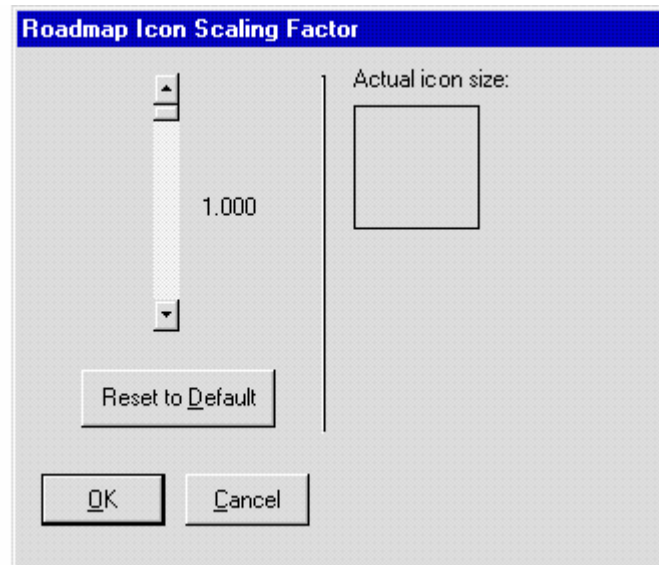
## How to resize boxes on the Roadmap

The Document, List and Matrix boxes can be made larger or smaller. (Note: All boxes must be the same size.) To change the size of these boxes:

- Select the Format - Preferences menu option
- Type in a new icon size in the Roadmap Icon Scaling edit area. Valid range of values is 1.0 to 3.2. The number is just a scaling factor of the default icon size

or

- Press the "..." button next to the Roadmap Icon Scaling value. This will bring up the Roadmap Icon Scaling Factor dialog box. Use the scroll bar to change the size of the box or use the Reset to Default button to restore the box size to a value of 1. Click on the OK button to save the change to the icon size.



## **How to print the Roadmap**

To print the Roadmap:

- Bring the Roadmap window to the front by clicking in it or by using the Windows menu.
- Select the File - Print - To Printer menu option.

This will open the Print dialog box. Click on the OK button to print the Roadmap.

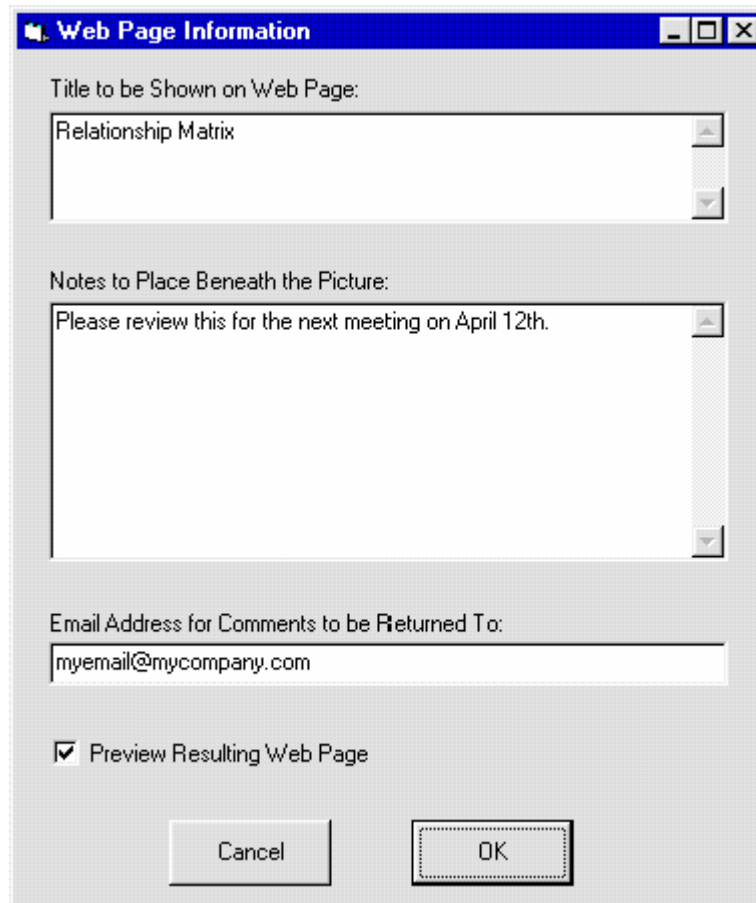
## **How to create a web page of a Roadmap**

To create a webpage that includes a picture of a Roadmap:

- Bring the Roadmap window to the front.
- Select File-Export Graphics-To Web Page from the menubar.
- Type in a name for the file and click on the Save button.

The Web Page Information dialog box that appears allows you to add the following information to the web page:

- Title that will be shown at the top of the web page
- Notes that will be placed beneath the Roadmap picture on the web page
- Email link that others can click on to send comments back to you



**Web Page Information**

Title to be Shown on Web Page:  
Relationship Matrix

Notes to Place Beneath the Picture:  
Please review this for the next meeting on April 12th.

Email Address for Comments to be Returned To:  
myemail@mycompany.com

Preview Resulting Web Page

Cancel OK

Type the above information into the dialog box. If there is information that you do not wish to include, simply leave the area blank. Then click on the OK button. You will see a preview of the Roadmap web page. Click on OK to close the window.

The web page that you have created can be emailed to others or made available on a web server.

To email a webpage, you will need to include both the HTML file and the JPEG file (the \*.jpg image file that was created).

To make the web page available on a webserver, you will need to place the HTML file and the JPEG file in the same directory.

## Chapter 4: List How To's

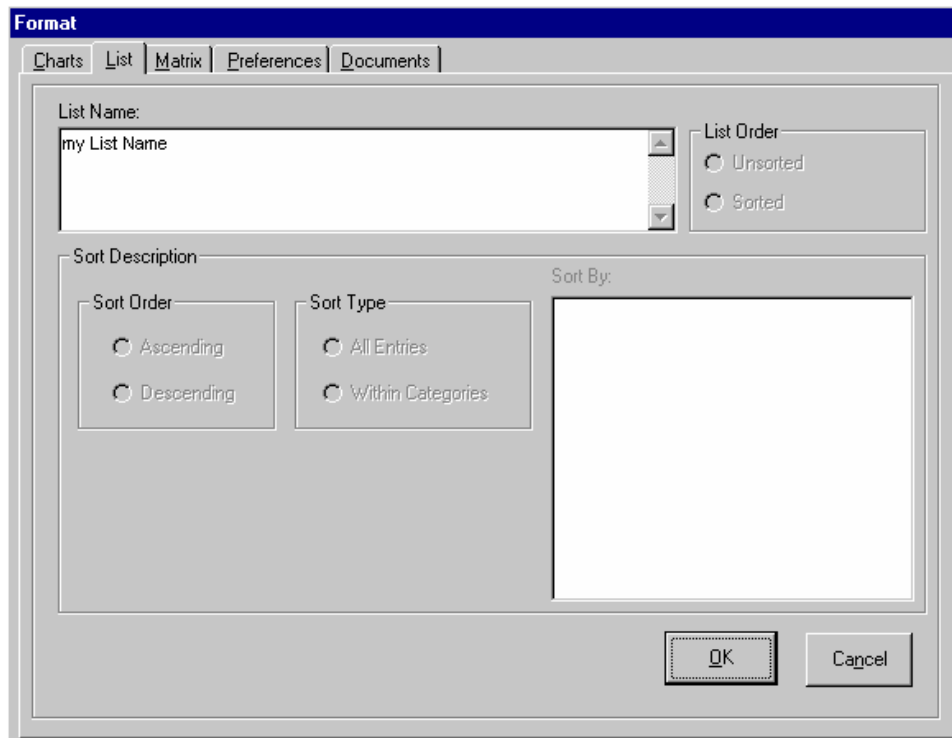
### How to create a List

To create a List:

- Select the Create - List menu option.

or

- Right-click on the Roadmap window background and select Create List from the pop-up menu.



This will open a new List window and the List tab of the Format dialog box. The List tab allows you to define the List Name and the Sort characteristics of the List. At this time, you simply need to enter the List Name. The optional sort characteristics can be defined after the List

Entries and Related Data Entries have been entered.

## How to change a List name

To change a List name:

- Right-click on the corresponding List block on the Roadmap and select Properties from the pop-up menu.

or

- With the List window open, select Format-List from the menu.

These actions will open the Format-List window. Type the desired name in the List Name area and click on the OK button.

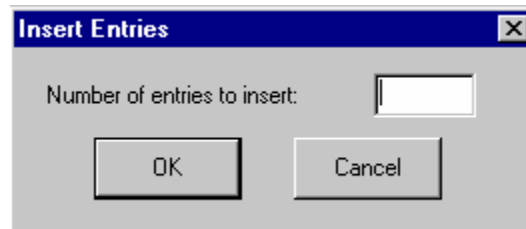
## How to add entries to a List

To add entries to a List:

- Click on the desired location in the List. Then select the Edit Insert menu option.

or

- Right-click on the desired location in the List. Then select Insert from the pop-up menu.



Then enter the number of new entries to insert and click on the OK button. You can then type the names of the new list entries into the added rows.

## How to create categories in a List

Category levels are used to identify subsets or logical groups of information. Each list entry can be considered as belonging to a category of information defined by another list entry. That defining entry is called a category or parent entry. The process of defining category levels is similar to outlining a document. For example, “Easy to make” and “Easy to clean up” might be considered members of the “Ease of Use” category.

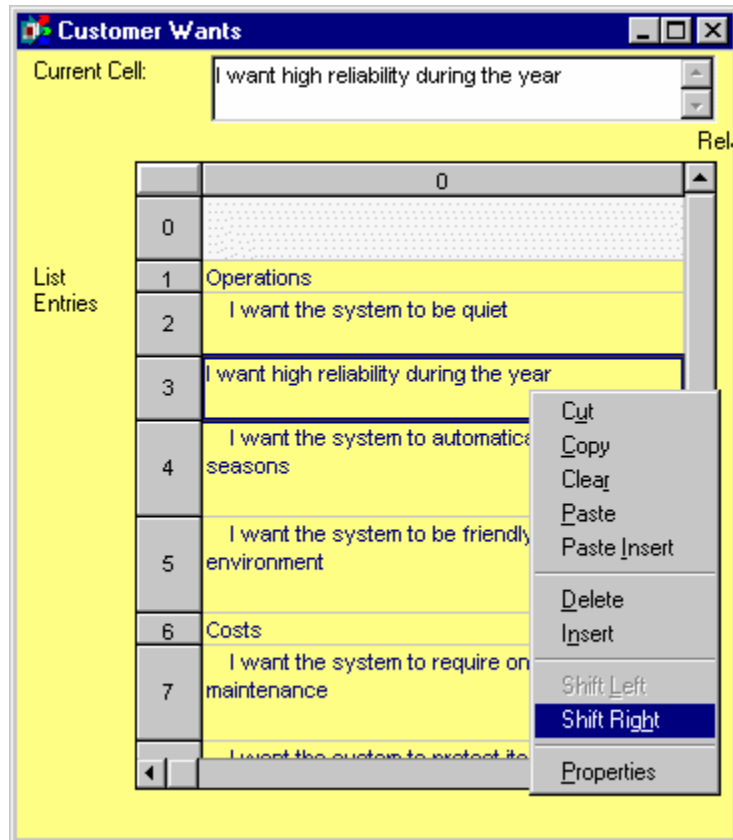
To define list entry category levels:

- Select the desired list entry and then select the Format - Category Level menu option.

or

- Right-click on the desired list entry and then select Shift Right or Shift Left from the pop-up menu.

To make the selected entry a child entry, select Shift Right. To make the selected entry a parent entry, select Shift Left.

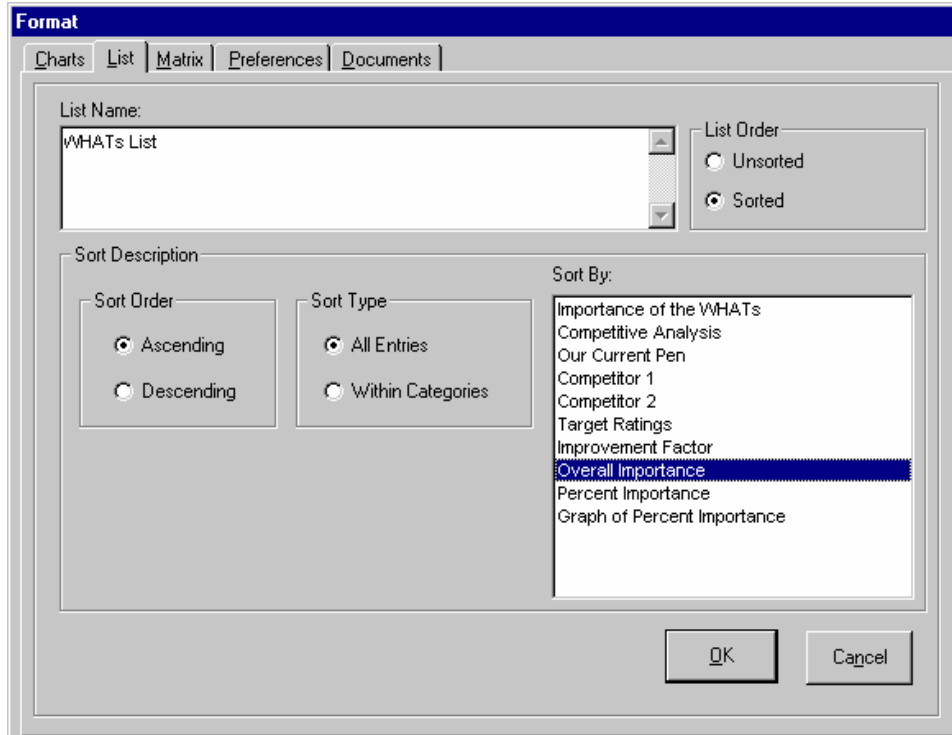


Note: Either of these options might not be available depending upon which entry has been selected. A primary level entry (one which has no parents) cannot be shifted left. An entry cannot be shifted right if that would result in the entry becoming “parentless”.

Category level is indicated either by indentation of the entry name or by the “>” symbol. The way it is shown is determined by the setting in the Format-Preferences “Show Category Level Marks in Lists” option. Each primary entry is indicated by a “>” symbol, a secondary by a “>>” symbol, etc.

## How to sort a List

Open the List window for the list that you want to sort. Select Tools-Sort from the menu bar.



- Select an item in the Sort By list. The values in the row/column associated with the selected item will be used to sort the list.
- Select the desired Sort Order: ascending or descending.
- Select the desired Sort Type.

"All Entries" will sort the entire list of entries, including any category headings that are in the List. This option is used to achieve a highest-to-lowest or lowest-to-highest sort order over the entire list.

If you have a List that includes categories and subentries, you may

want to select the "Within Categories" type. This option will sort the subentries under each category as a subgroup - maintaining the category heading's location within the List. This option is used to view relative values within each category.

## **How to move list entries**

To move list entries to different locations within a List:

- Within the List window, select the rows of the list entries to be moved.
- Position the cursor near the boundary of the selected area so that an "Arrow" cursor is visible
- Press and hold the mouse button
- Drag the selected entries to the desired location

The selected entries will be inserted into the desired location. This drag-and-drop process does not leave blank rows in the previous location of the entries.

The Move process will maintain consistent Category Levels. For example, if you are dropping a parent Entry between two child Entries, the dropped Entry will become a child Entry.

You cannot use the drag-and-drop method to move the contents of Data Cells. To do this, use the Cut, Copy and Paste operations.

## **How to delete list entries**

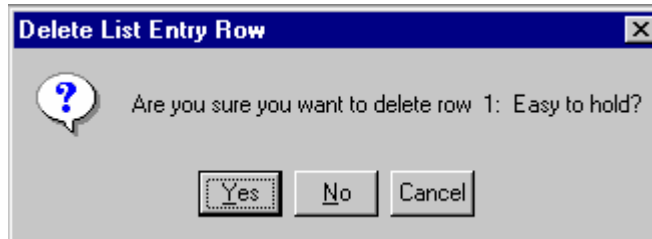
List entries can be deleted from within the List window or from within a Matrix window spreadsheet view. The following operations will delete one or more list entries:

- Select the desired list entries, then select the Edit - Delete menu option.
- Select the desired list entries, then right-click on the selection area

and select Delete from the pop-up menu.

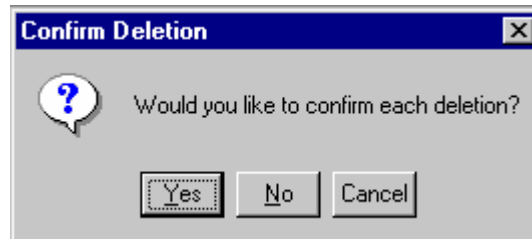
If only one list entry is selected, then the Delete List Entry Row dialog box asks if you would like to delete the selected Entry. Three options are available.

- The “Yes” option will delete the selected list entry.
- The “No” option will cancel the delete operation.
- The “Cancel” option will cancel the delete operation.



If more than one List Entry is selected, then a Confirm Deletion dialog box asks if you would like to confirm each deletion. Three options are available.

- The “Yes” option will prompt you to confirm your intention to delete each list entry.
- The “No” option will automatically delete all selected list entries.
- The “Cancel” option will cancel the delete operation.

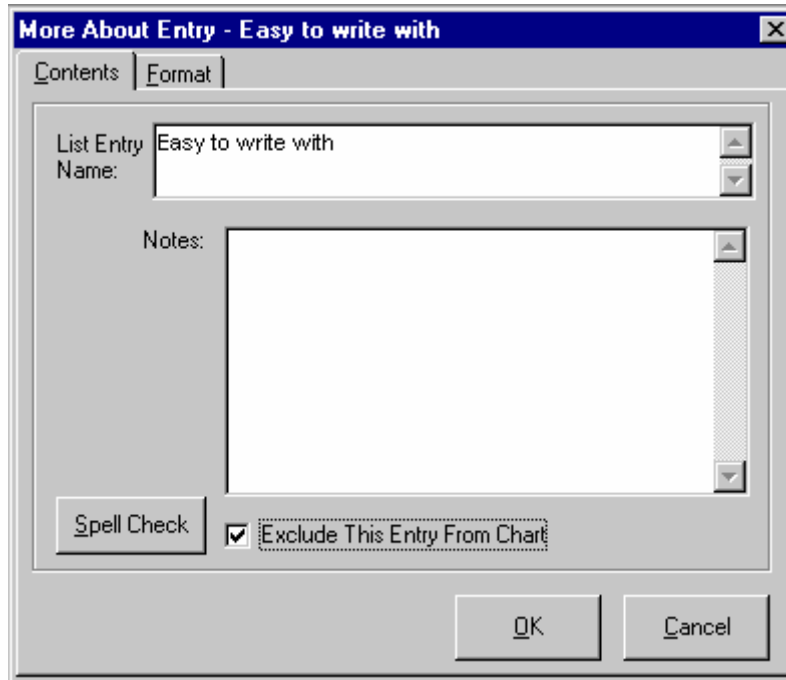


## How to exclude a list entry from charts

List Entries can be excluded or hidden from QFD charts in order to customize them for a specific audience or to protect confidential information.

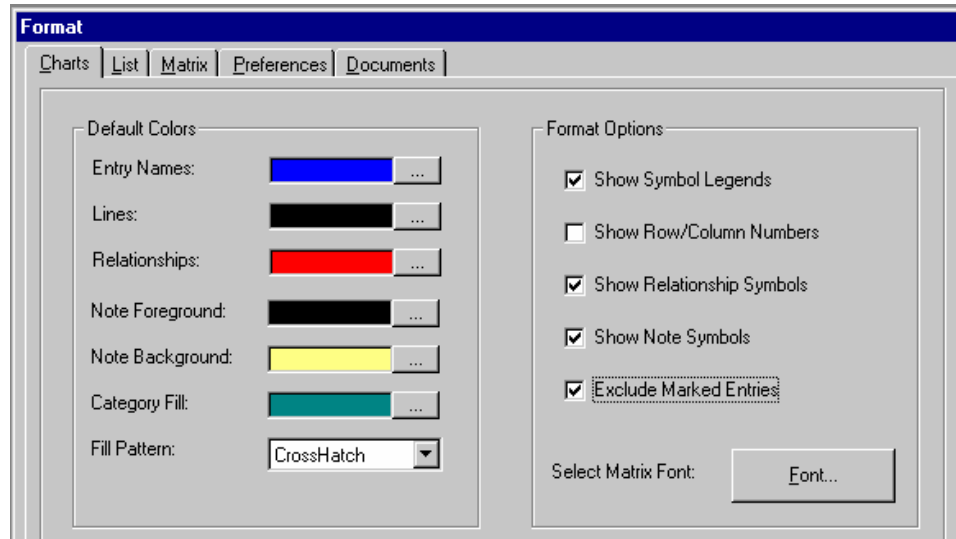
To exclude a list entry from all QFD charts:

- Double-click on the desired List Entry name or its row number in the List Spreadsheet window or on its name, row number, or column number in the Matrix Spreadsheet view.



By clicking on the Exclude This Entry From Chart checkbox, this list entry will be excluded from all QFD charts - until you indicate to the software that you would like it included again. This setting does not remove the list entry from the file. It will still appear in the List Spreadsheet window and any Matrix spreadsheet views.

Entries that you have selected to be excluded from QFD charts will only be excluded if the Exclude Marked Entries formatting option is checked in the Format-Charts dialog box (see below). This Exclude Marked Entries option provides a one-step method for including or excluding all marked entries in QFD charts. Using this you can bring all marked entries into the charts or remove them all - with one operation.



## Chapter 5: Related Data How To's

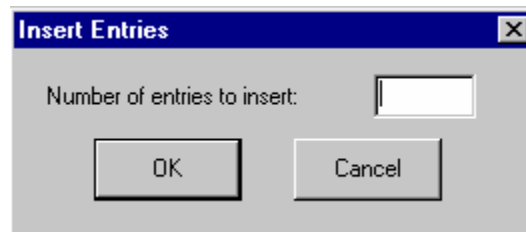
### How to add a related data entry

To insert new Related Data Entries, open the List window containing the List that the entries will be related to. Then:

- Select the desired column location of the new Related Data Entries, then select the **Edit - Insert** menu option.

or

- Right-click on the desired column location of the new Related Data Entries, then select **Insert** from the pop-up menu.



Then type in the number of Related Data Entries to add, and click on the OK button.

**Hint:** To insert a Related Data Entry column that you have copied to the clipboard, use the **Edit - Paste Insert** menu option.

### How to add notes to related data entries

Notes can be added to Related Data Entries to record background, source, discussion or other information. To add a note to a Related Data Entry:

- Double-click on the desired related data entry.

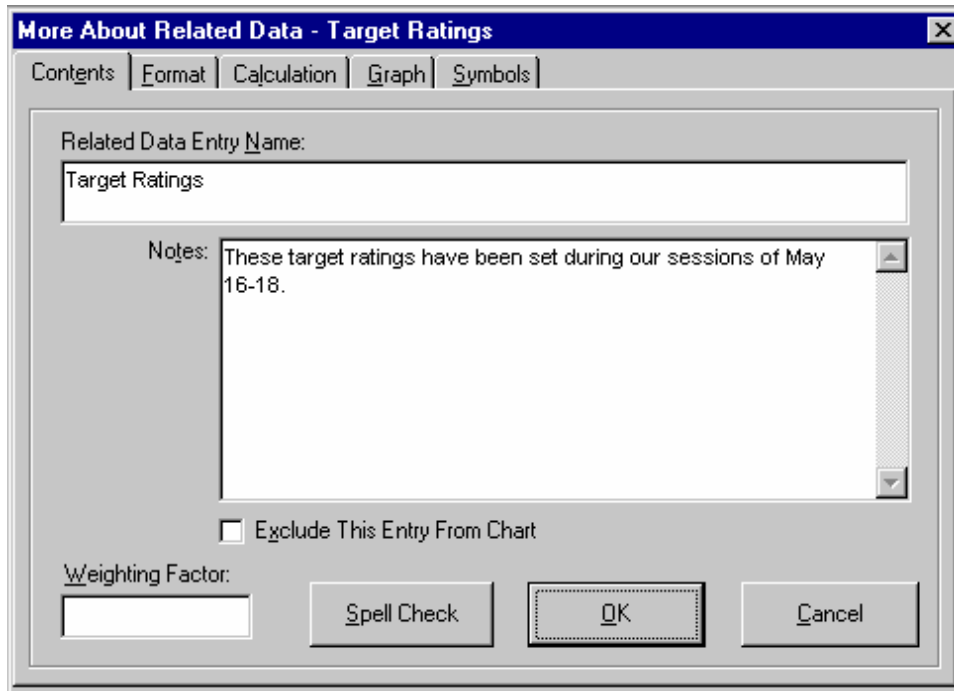
or

- Right-click on the desired related data entry and select Properties from the pop-up menu.

or

- Click on the desired related data entry to select it. Then select the Format - Selected Items menu option.

These actions will open the Contents tab of the More About Related Data dialog box.



Any entry for which Notes exist will be identified by an asterix (\*) located adjacent to the Related Data Entry name. An example is seen following. Notes are limited to 32,767 characters.

	0	4	5	6
0		Competitor 1	Competitor 2	Target Ratings *
1	Easy to hold	3	3	4
2	Easy to transport (other than holding in hand)	2	3	4
3	Easy to write with	3	4	5
4	Looks cool	2	2	4

Note: If the Date and Author Stamping feature is turned on, you will also see Date and Author stamping options. For more information, see “How to provide an audit trail for data”.

## How to clear related data entry names

The Clear operation is available to clear (empty) the contents of existing Related Data Entry names. Any formatting and notes associated with the entry cells will be maintained. The following Clear methods are available:

- Select the desired Related Data Entries, and then select the Edit - Clear menu option.

or

- Select the desired Related Data Entries, and then right-click on the selection area and select Clear from the pop-up menu.

You will be prompted to confirm your intentions.

## How to change the name of a related data entry

To change the name of a Related Data Entry:

- Click on the cell containing the name to be changed in the List spreadsheet. Then make the desired changes to the name in the Current Cell area.

or

- Double-click on the cell containing the name to be changed in the List spreadsheet. In the Contents tab of the More About Related Data Entry dialog box, make the desired changes to the name in the Related Date Entry Name area. Then click on OK.

### **How to cut related data entries**

The Cut operation allows you to move the contents of the selected cells to the clipboard. The selected cells will be cleared. To cut Related Data Entries:

- Select the Related Data Entry names or column number labels that you wish to cut, then select the Edit - Cut menu option.

or

- Select the Related Data Entry names or column number labels that you wish to cut, then right-click on the selection area and select Cut from the pop-up menu.

### **How to copy related data entries**

The Copy operation allows you to copy (duplicate) the contents of the selected cells to the clipboard. To copy Related Data Entries:

- Select the Related Data Entry names or column number labels that you wish to copy, then select the Edit - Copy the menu option.

or

- Select the Related Data Entry names or column number labels that

you wish to copy, then right-click on the selection area and select Copy from the pop-up menu.

Note: The Copy operation does not maintain the format properties of the cells that are copied. These properties include Notes, Calculations, Symbols, Graphs, and other formatting characteristics.

## How to paste related data entries over existing data

The Paste operation allows you to paste the contents of the clipboard into existing selected target cells. To paste Related Data Entries:

- Select the desired target Related Data Entries, then select the Edit - Paste menu option.

or

- Select the desired target Related Data Entries, then right-click on the selection area and select Paste from the pop-up menu.

The target rows, columns, or data cells must have either the same dimensions (number of rows and columns) as the data that was copied to the clipboard or the target must be a single data cell (called a pivot cell).

Warning: The Paste operation will automatically overwrite any information contained in the selected rows, columns, or data cells.

## How to paste related data entries as inserted entries

The Paste Insert operation allows you to paste the contents of the clipboard into columns that are automatically inserted for you. To use Paste - Insert:

- Select the desired target column, then select the Edit - Paste Insert menu option.

or

- Select the desired target column, then right-click on the selection area and select Paste-Insert from the pop-up menu .

Hint: Paste operations can be used to transfer data from other applications into the List and Matrix spreadsheets. Use the Edit - Copy operation in the other application. Then use Edit - Paste within the List or Matrix spreadsheet.

## **How to move related data entries**

To move related data entries to different column locations:

- Select the columns to be moved
- Position the cursor near the boundary of the selected area so that an “Arrow” cursor appears
- Press and hold the left mouse button
- Drag the selected entries to the desired location

The selected entries will be inserted into the specified location. The Move process does not leave blank columns in the previous locations of the entries. All data values in the Related Data column are moved along with the Related Data Entry itself.

The Move process will maintain consistent Category Levels. For example, if you are dropping a parent entry between two child entries, the moved entry will also become a child entry.

You are not permitted to move the contents of data cells using the drag and drop method. To do this, use the Cut, Copy and Paste operations.

## **How to edit properties of a related data entry**

To edit the properties of a Related Data Entry:

- Double-click on the desired Related Data Entry name or its column number.

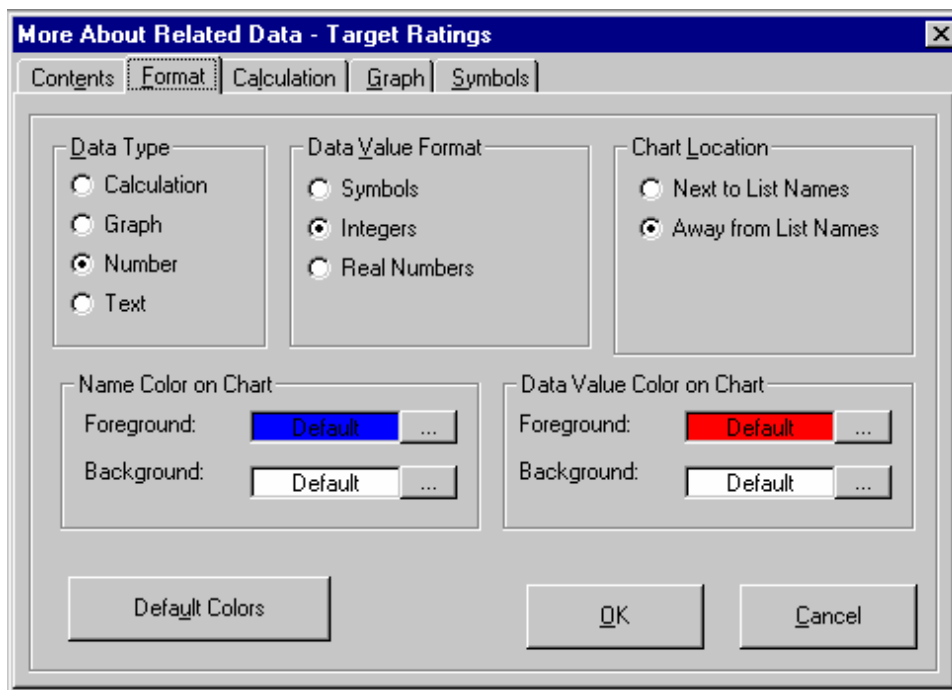
or

- Right-click on the desired Related Data Entry and select Properties from the pop-up menu.

or

- Select the desired Related Data Entry and then select the Format - Selected Items menu option.

This will open the More About Related Data dialog box. This dialog box has five Tabs: Contents, Format, Calculation, Graph, and Symbols.



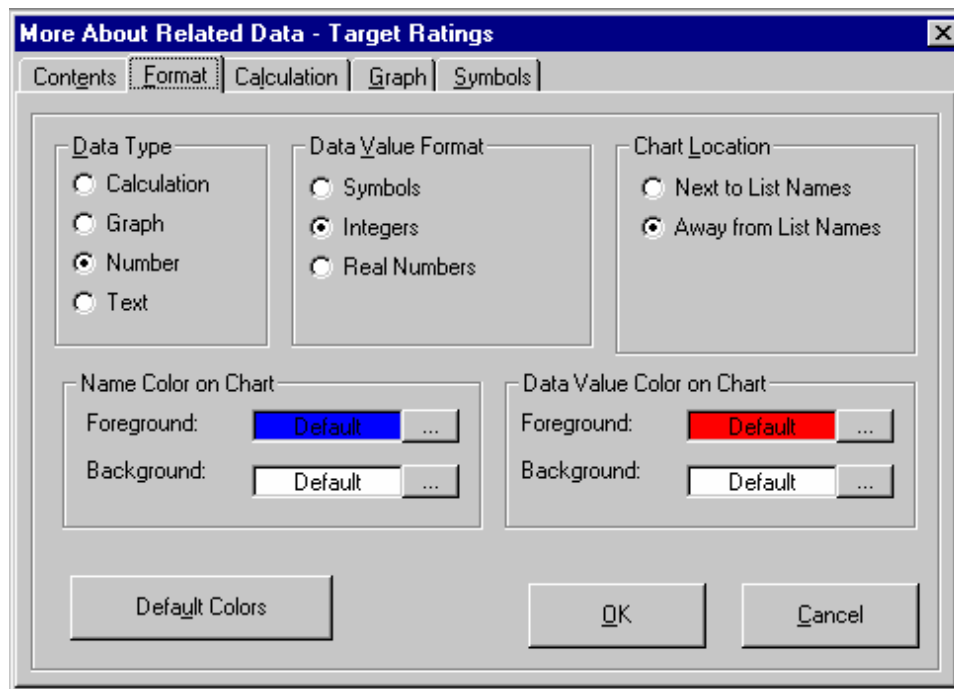
Note: If more than one related data entry was selected before bringing up the dialog box, “Multiple Entries” is shown in the title bar. The properties that can be set for multiple entries at one time is limited to: Excluding entries from charts, setting name color and data value color, setting the numeric data value format, setting the text format, and specifying the chart location of the entries.

## How to change the data type of a related data entry

Each Related Data Entry has a data type. The data type describes the data values that are stored in the row or column for that entry. Four options are available. The data type can be: Number, Text, Calculation, or Graph. The default data type - if you do not specify one - is Number.

To change the data type of a Related Data Entry:

- Double-click on the Related Data Entry name in the List window spreadsheet. This will open the More About Related Data dialog box.
- Click on the Format tab. The Data Type group box on the left allows you to select the data type for the Related Data Entry.



The options are:

- Number - The numbers can be displayed as Integers, Real Numbers or Symbols. Select the desired format in the Data Value

Format box. This type must be used if data will be used for calculations.

- Text - Each text value is limited to 255 characters.
- Calculation - The specific calculation parameters are defined in the Calculation tab. The Calculation tab allows you to select a specific mathematical relationship (formula) for the Related Data Entry. For more information about setting up calculations, see How to setup a calculation.
- Graph - Can be setup as a line graph or a bar graph. In the Matrix chart view, this related data entry will display a graph of the data found in the specified source Related Data Entries. The Graph tab allows you to setup specific parameters for the graph.. For more information about setting up graphs, see How to setup a graph.

Note: Multiple related data entries can be formatted at once. To do this, select the Related Data Entries to be formatted. Then right-click on the selected entries and select Properties from the pop-up menu. You can select either Number or Text format. Calculation and Graph entries must be setup one at a time.

## How to setup a calculation

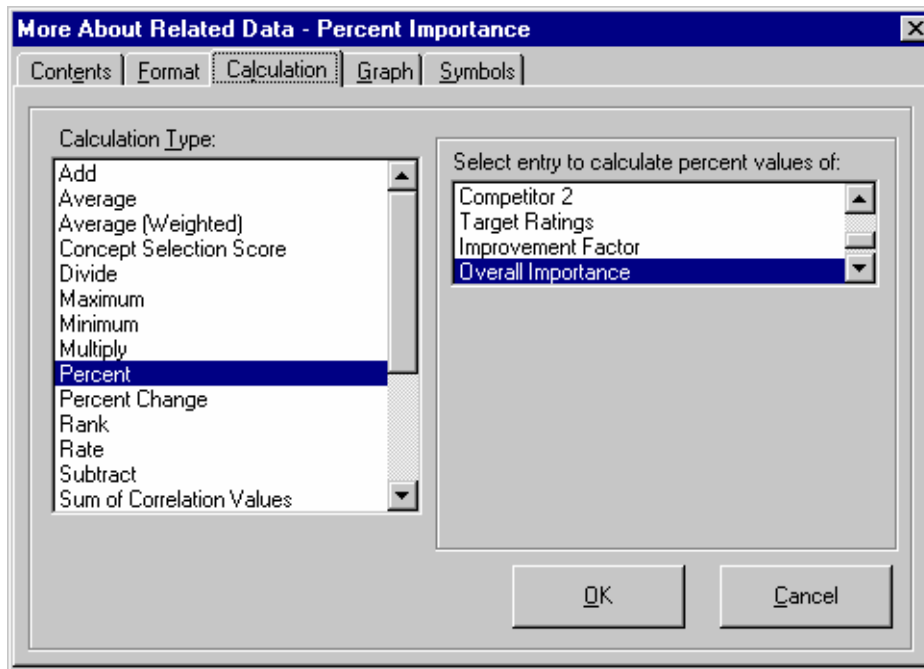
To setup a calculation:

- Double click on the List block in the Roadmap which will provide the source data for the calculation.
- Type in a Related Data Entry column name for the new calculation entry (either in the empty column at the right end of the spreadsheet or in a newly inserted column)
- Double click on the new column name

The More About Related Data dialog box will appear. Do the following:

- Click on the Format tab

- Select Calculation in the Data Type group box
- Click on the Calculation tab



When you select the particular calculation that you are interested in on the left, specific options for that calculation will be shown on the right. Select the desired options and click on OK.

For detailed information about all of the calculations supported, see the “Calculation Reference” section.

## How to setup a graph

To setup a graph:

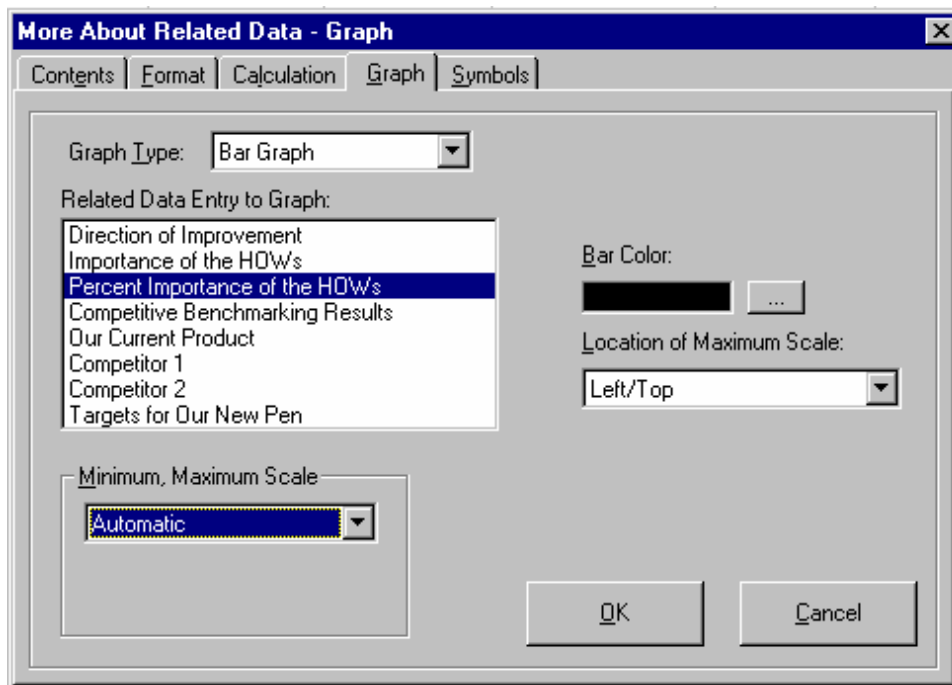
- Double click on the List block in the Roadmap which will provide the data for the graph

- Type in a Related Data Entry column name for the new graph entry (either in the empty column at the right end of the spreadsheet or in a newly inserted column)
- Double click on the new column name

The More About Related Data dialog box will appear. Do the following:

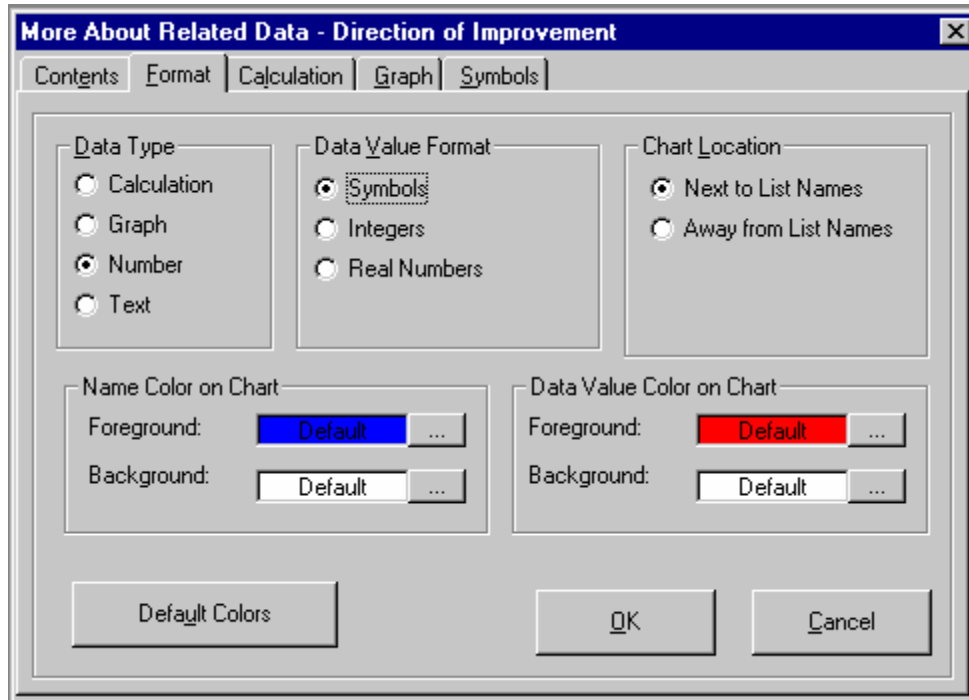
- Click on the Format tab
- Select Graph in the Data Type group box
- Click on the Graph tab

The Graph Type list allows you to define the graph format for the selected graph entry. Select either: Bar Graph or Line Graph.

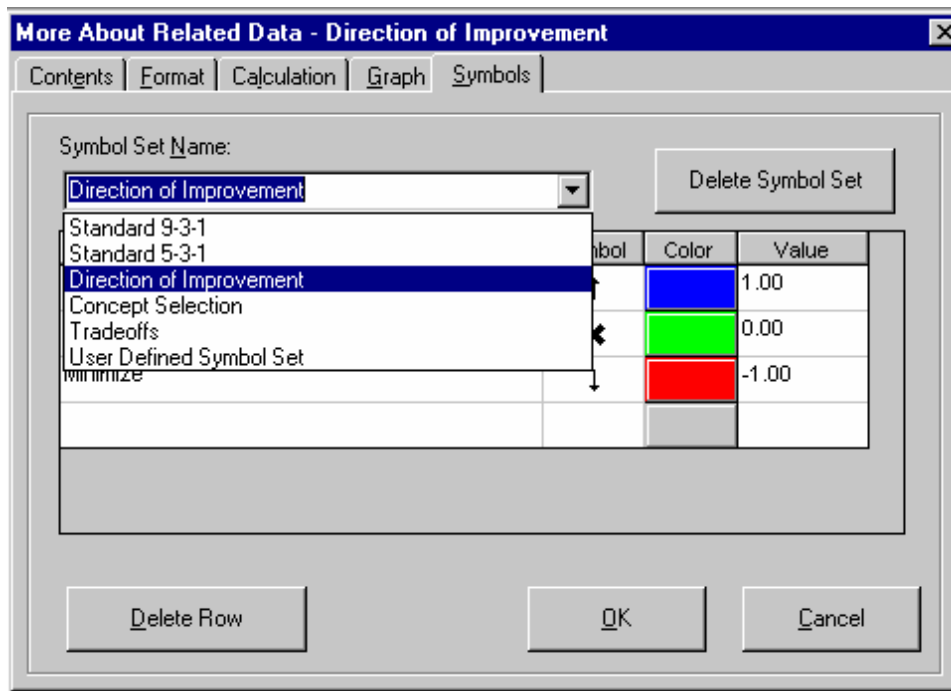


## How to select a set of symbols for a related data entry

- Double-click on the desired Related Data Entry name in the List window spreadsheet. This will open the More About Related Data dialog box.
- Click on the Format tab.
- Select Symbols from the Data Value Format options.



- Click on the Symbols Tab.
- Select the desired symbol set from the drop down list.



If the standard symbol sets provided do not suit the needs of your data, you can create a custom symbol set. See the following section for more information.

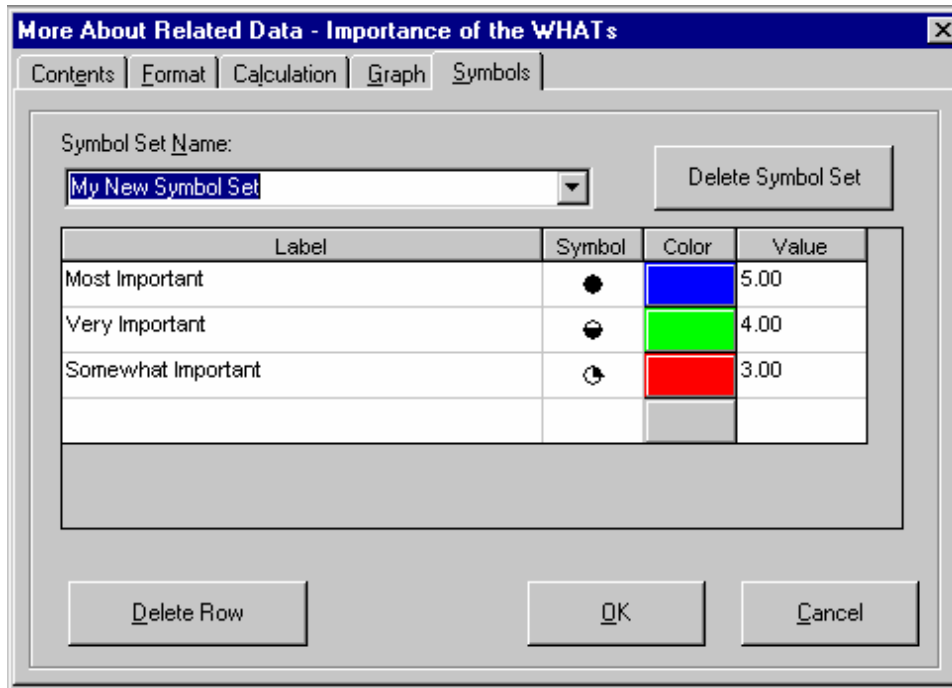
### How to setup symbols for a related data entry

If the standard symbol sets provided do not suit the needs of your data, you can create a custom symbol set. To do this:

- Double-click on the desired Related Data Entry name in the List window spreadsheet. This will open the More About Related Data dialog box.
- Click on the Format tab.
- Select Symbols from the Data Value Format options.
- Click on the Symbols tab.

Then:

- Click on the drop-down list arrow under the heading "Symbol Set Name" .
- Click on "User Defined Symbol Set" .
- Type a name for your new symbol set in the Symbol Set Name edit area.



For each symbol in your symbol set, complete the following steps:

- Enter a Label. The label will appear in the symbol legend on charts.
- Select a Symbol by clicking in the symbol cell. A Symbol Selection dialog box will be shown. Choose the desired symbol or type in a keyboard character that you wish to use as a symbol. Then click on OK.

- Select a Color by clicking on the color button. A Color dialog box will be shown. Choose the desired color. Then click on OK.
- Enter a numeric value that the symbol in that row is to represent into the Value cell of the table. Each symbol must have a numeric value and each value must be unique.

You can define as many symbols as you would like for each user defined symbol set. Typically, two to five symbols are defined for each symbol set.

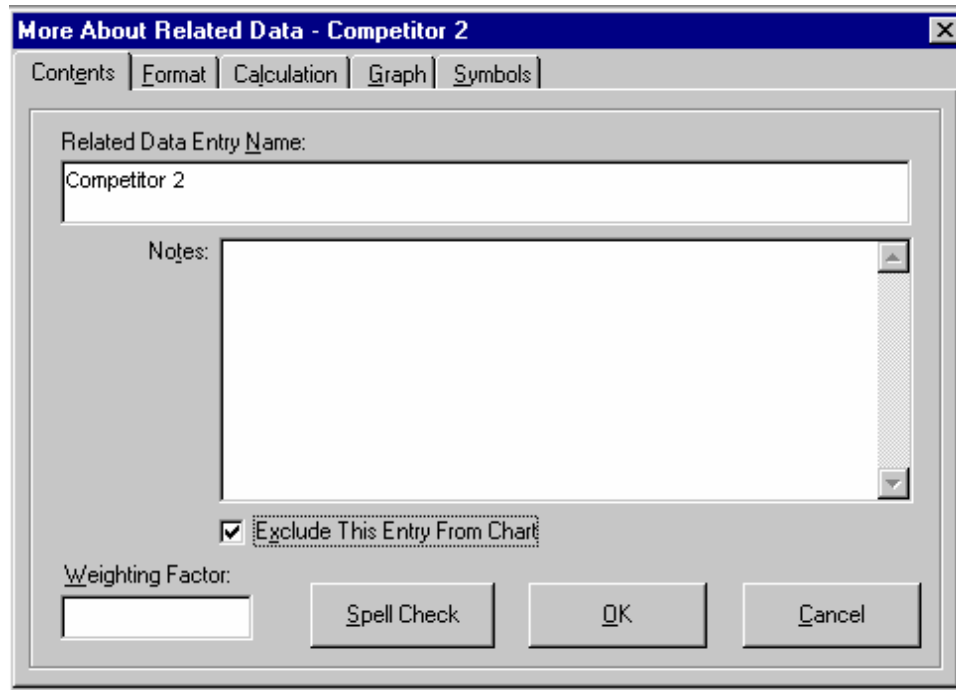
To remove a row from the symbol set table, select the row by placing the cursor in that row. Then click on the Delete Row button.

## How to exclude a related data entry from charts

Related Data Entries can be excluded or hidden from QFD charts in order to customize them for a specific audience or to protect confidential information.

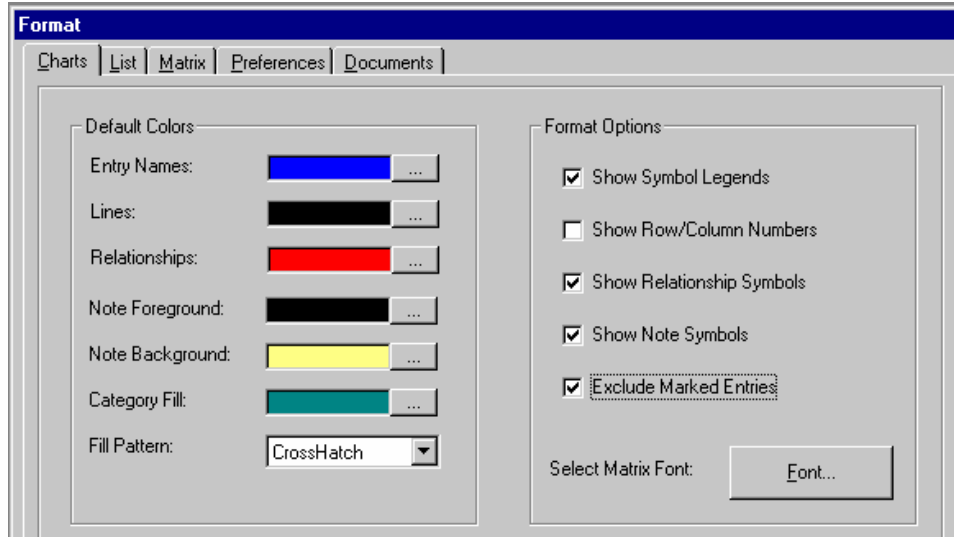
To exclude a Related Data Entry from all QFD charts:

- Double-click on the desired Related Data Entry name or its column number in the List Spreadsheet window.



By clicking on the Exclude This Entry From Chart checkbox, this Related Data Entry will be excluded from all QFD charts - until you indicate to the software that you would like it included again. This setting does not remove the Related Data Entry from the file. It will still appear in the List Spreadsheet window.

Hint: Entries that you have selected to be excluded from QFD charts will only be excluded if the Exclude Marked Entries formatting option is checked in the Format-Charts dialog box (see below). This Exclude Marked Entries option provides a one-step method for including or excluding all marked entries in QFD charts. Using this you can bring all marked entries into the charts or remove them all - with one operation.



## Chapter 6: Matrix How To's

### How to create a matrix

To create a Matrix:

- Select the Create-Matrix menu option.

or

- Right-click on the Roadmap window background and select Create-Matrix from the pop-up menu.

**Format**

Charts | List | **Matrix** | Preferences | Documents

Matrix Name: Relationship Matrix View: As Spreadsheet

Input List(s) to form rows: WHATs List, HOWs List

Output List(s) to form columns: WHATs List, HOWs List

Symbol Set: Standard 9-3-1 [Delete Symbol Set] [Delete Row]

Label	Symbol	Color	Value
Strong	●	Blue	9.00
Moderate	○	Green	3.00
Weak	▽	Red	1.00

Relationship Data Format: Integer [Rooms in Chart...] [OK] [Cancel]

Type a name for the new matrix in the Matrix Name area.

A Matrix is formed by relating one List with another List. The List that

forms the rows of the matrix is called the Input List. The List that forms the columns of the matrix is called the Output List. The relationships between the Input and Output Lists are the relationship cells of the Matrix.

Select a list under the heading "Input List(s) to form rows" and also select a list under the heading "Output List(s) to form columns".

There can be multiple Lists forming a set of input rows or output columns of a Matrix. To select multiple lists, you can hold the Control key or Shift key to select a range while clicking on the desired list names. Applications in which there are multiple Input Lists or Output Lists are for advanced use and will be discussed later.

To create a Roof or Tradeoff Matrix, select the same List as both the Input List and Output List.

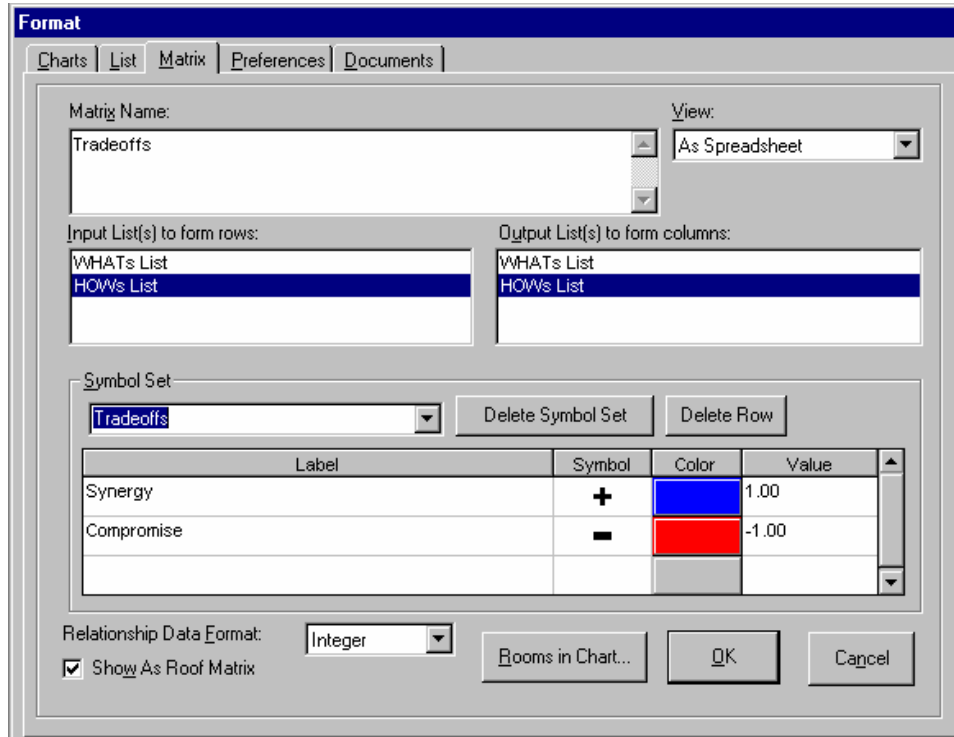
You can elect to use the standard relationship symbol set or another standard symbol set, or you can create your own custom set of symbols to use.

Click on OK when you are done setting up the matrix properties.

## **How to create a roof matrix**

To create a roof matrix:

- Select the Create-Matrix menu option.
- or
- Right-click on the Roadmap window background and select Create-Matrix from the pop-up menu.



Type a name for the new roof matrix in the Matrix Name area.

Since a roof matrix records the interrelationships between the entries in one list, you should select the same list name under the heading "Input List(s) to form rows" and under the heading "Output List(s) to form columns".

You can elect to use the standard Tradeoffs symbol set that is presented to you, or you can create your own custom set of symbols to use.

To show the familiar triangular roof icon on this matrix in the Roadmap, select the Show As Roof Matrix checkbox.

Click on OK when you are done setting up the matrix properties.

## How to add matrix relationships in the spreadsheet view

To add matrix relationships in the spreadsheet view:

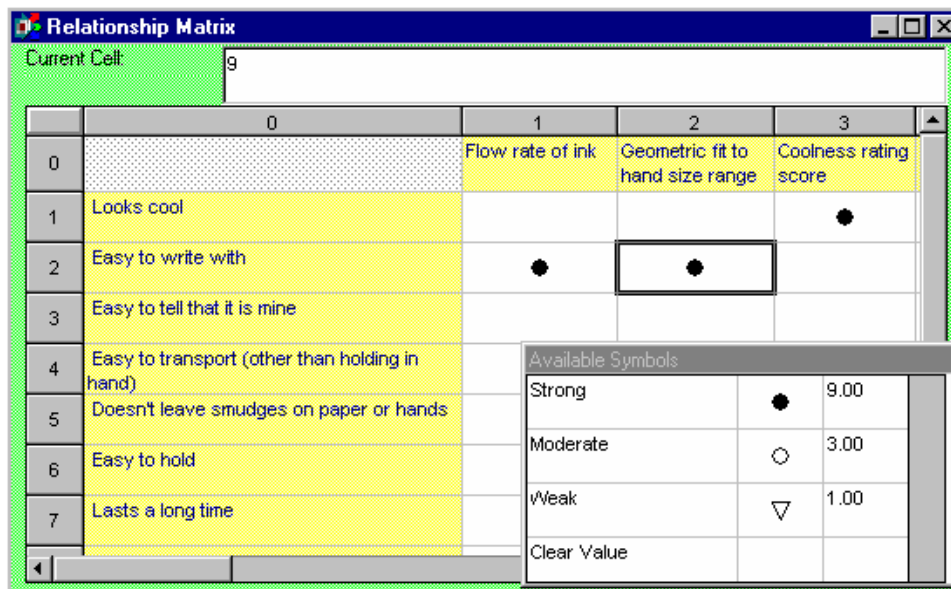
- Double-click on the corresponding Matrix block in the Roadmap to open the Matrix window.
- Select View-As Spreadsheet from the menu.

To add relationships between the Input List (rows) and Output List (columns) entries:

- Click on the cell where the row intersects with the column.
- Type in a numeric relationship value.

or

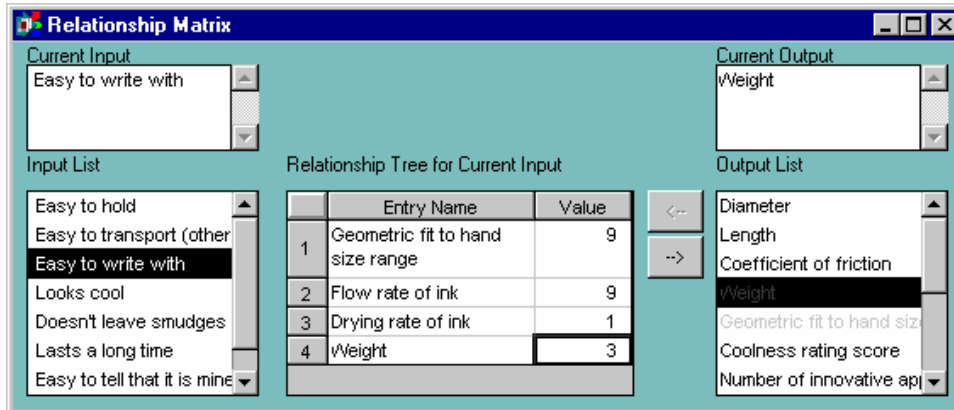
- Click on the desired symbol row of the Available Symbols pop-up window that appears whenever you click on a relationship cell. The associated symbol will be placed in the cell.




## How to add matrix relationships in the tree view

To add matrix relationships in the relationship tree view:

- Double-click on the corresponding Matrix block in the Roadmap to open the Matrix window.
- Select View-As Relationship Tree from the menu.



- Select the desired row entry from the Input List on the left.
- Select the desired column entry from the Output List on the right.
- Click on the  button.
- Type in the value for the new relationship under the Value column heading.

After adding the relationship, the selected entry in the Output List will be displayed in gray. This indicates that there has already been a relationship established for that entry. Any entries in the Output List that have not been related to the current Input entry will be displayed in black.

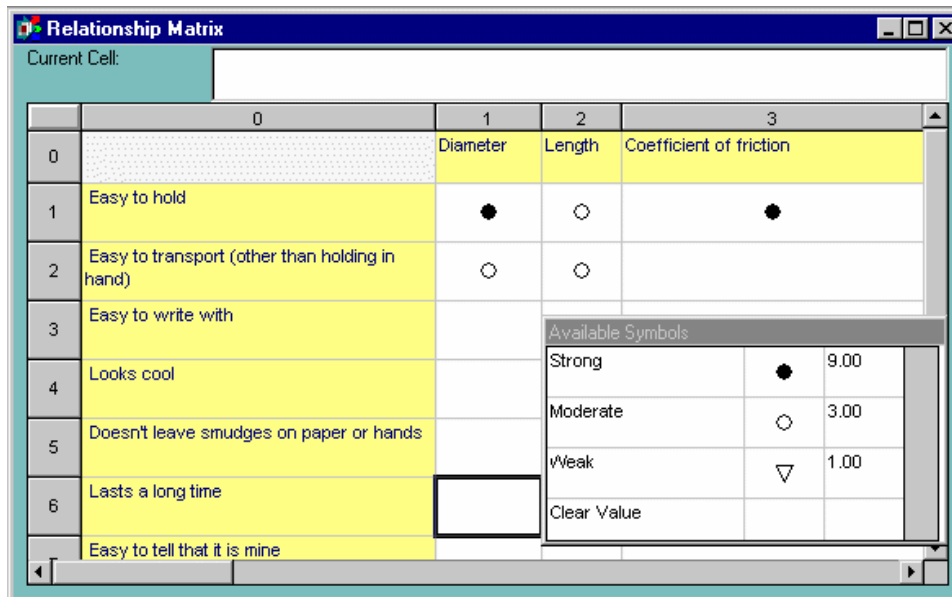
## How to delete a matrix relationship in the spreadsheet view

To delete an existing relationship in the spreadsheet view:

- Click on the relationship cell to be deleted.


- Click on the Clear Value row in the Available Symbols window.

The cell will be cleared of the relationship value or symbol.



## How to delete a matrix relationship in the tree view

To delete an existing relationship in the relationship tree view:

- Select the row entry for the relationship from the Input List on the left.
- Click on the relationship row to be deleted in the Relationship Tree table in the center.
- Click on the  button.

You will then be prompted for confirmation to delete the relationship.

## How to select a set of relationship symbols for a matrix

To select a set of relationship symbols for a particular matrix:

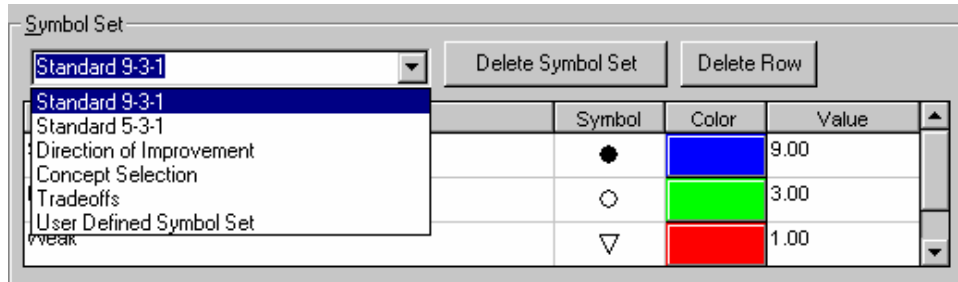
- Right-click on the Matrix block in the Roadmap and select Properties from the pop-up menu.

or

- Open the desired Matrix window and select Format-Matrix from the menu.

Then:

- Click on the drop-down list arrow under the heading "Symbol Set".
- Select the desired symbol set.
- Click on the OK button.



If the standard symbol sets provided do not suit the needs of your data, you can create a custom symbol set. See the following section for more information.

## How to create a custom symbol set

If the standard symbol sets provided do not suit the needs of your data, you can create a custom symbol set. To do this:

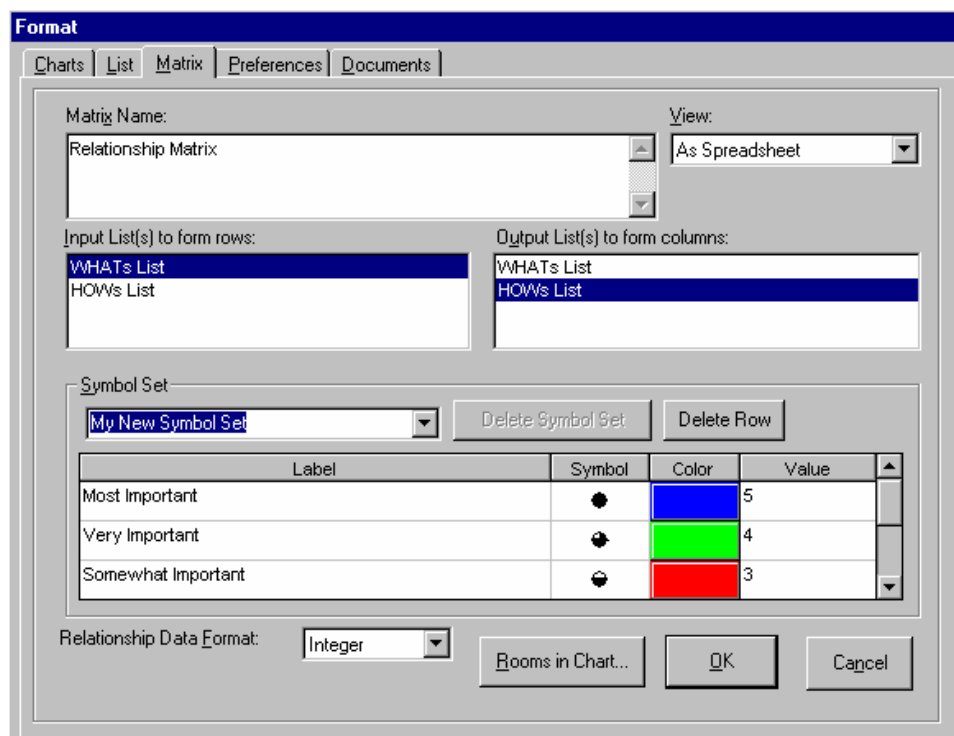
- Right click on the Matrix block in the Roadmap and select Properties from the pop-up menu.

or

- Open the desired Matrix window and select Format-Matrix from the menu.

Then:

- Click on the drop-down list arrow under the heading "Symbol Set"
- Click on "User Defined Symbol Set" .
- Type a name for your new symbol set in the Symbol Set Name edit area.



For each symbol in your symbol set, complete the following steps:

- Enter a Label. The label will appear in the symbol legend on charts.
- Select a Symbol by clicking in the symbol cell. A Symbol Selection dialog box will be shown. Choose the desired symbol or type in a keyboard character that you wish to use as a symbol. Then click on OK.
- Select a Color by clicking on the color button. A Color dialog box will be shown. Choose the desired color. Then click on OK.
- Enter a numeric value that the symbol in that row is to represent into the Value cell of the table. Each symbol must have a numeric value and each value must be unique.

You can define as many symbols as you would like for each user defined symbol set. Typically, two to five symbols are defined for each symbol set.

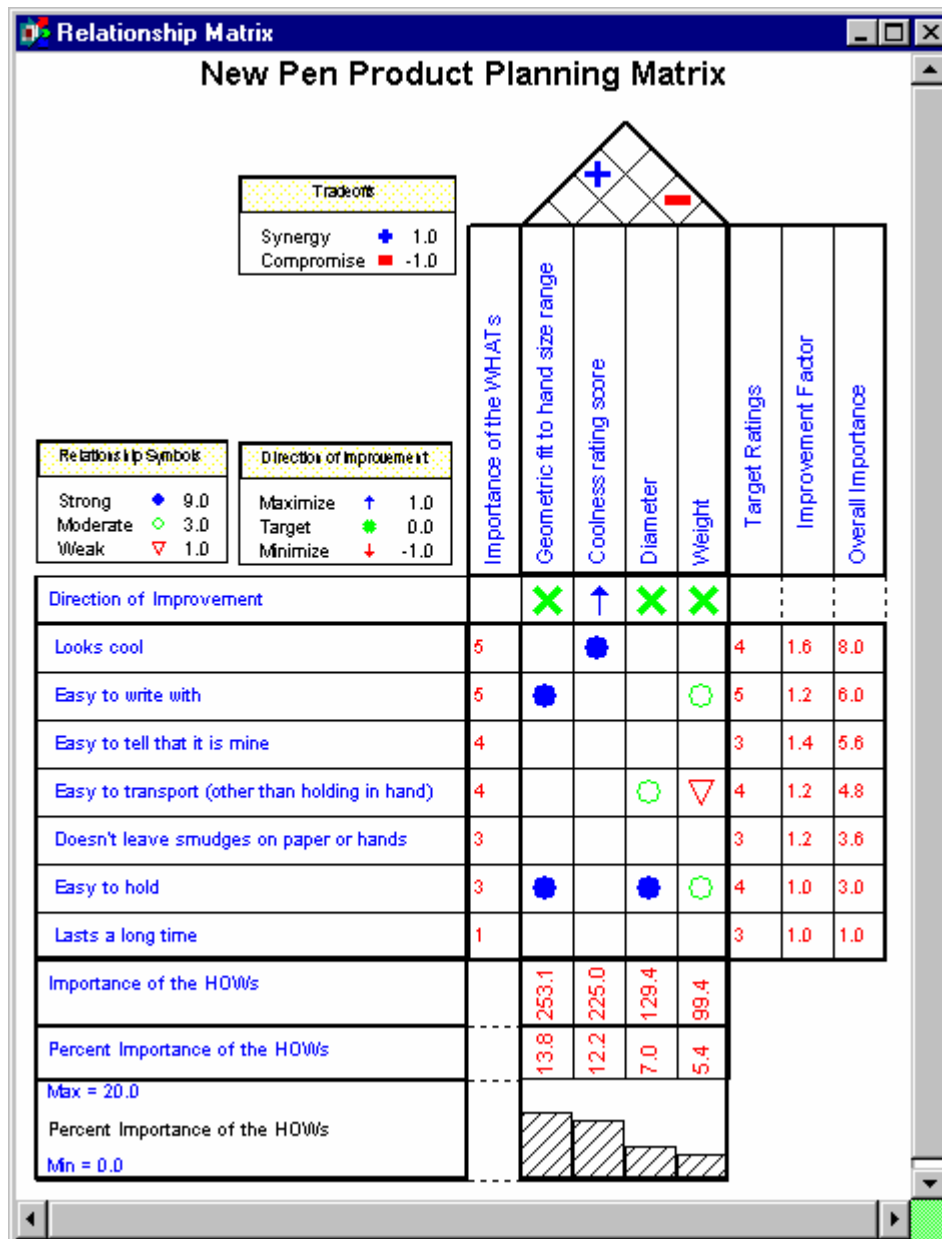
To remove a row from the symbol set table, select the row by placing the cursor in that row. Then click on the Delete Row button.

## Chapter 7: Chart How To's

### How to view a chart

To view a chart:

- Double-click on the corresponding Matrix block in the Roadmap to open the Matrix window.
- Select View-As Chart from the menu.



Sample QFD Chart

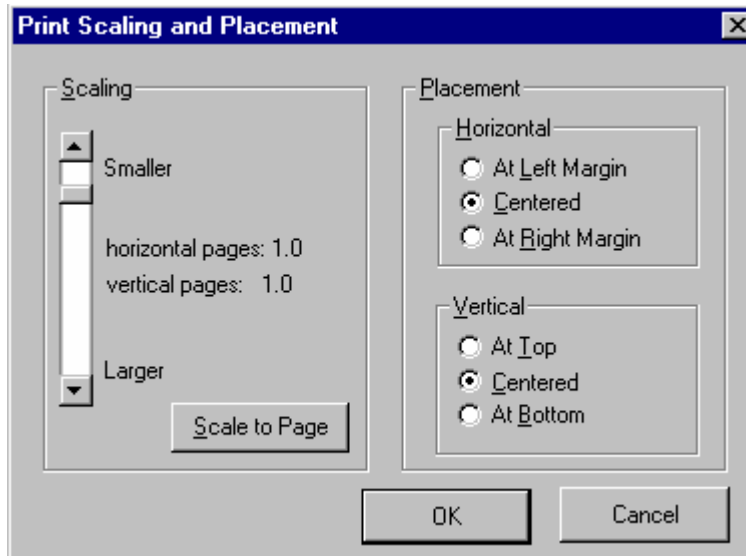
## How to print a chart

To print a chart:

- Double-click on the corresponding Matrix block in the Roadmap to open the Matrix window
- Select View-As Chart from the menubar
- Select File-Print-To Printer from the menubar
- Click on the OK button in the Print dialog box
- Click on the OK button in the Print Scaling and Placement dialog box

If you don't change the Scaling, the chart will be scaled to fit one printed page. Note that the chart will be scaled to whatever page size you are printing to. For example, if you print to an E-size plotter the chart will fill the E-size width.

If you slide the Scaling scrollbar toward "Smaller", the chart will fill less than the full page. If you slide the scale toward "Larger", the chart will span multiple pages. This would be used to make larger charts more readable when printing to a smaller paper size.



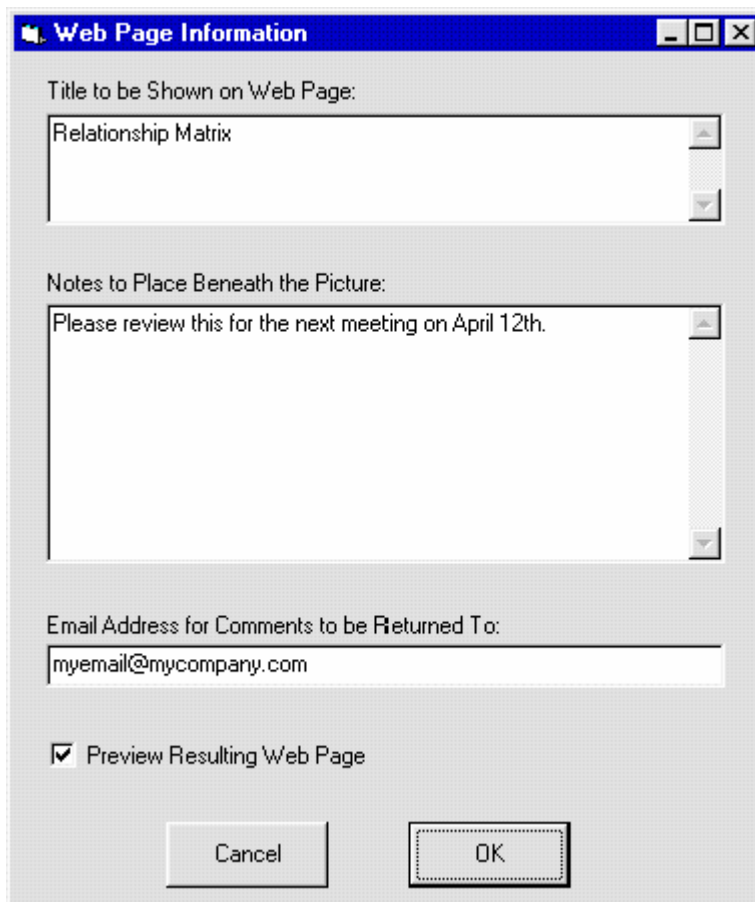
## How to create a web page of a chart

To create a webpage that includes a picture of a QFD chart:

- Double-click on the desired Matrix block in the Roadmap to open the Matrix window.
- Select View-As Chart from the menubar.
- Select File-Export Graphics from the menubar.
- Select “Web Page (\*.HTM)” in the “Save As Type” list.
- Type in a name for the file and click on the Save button.

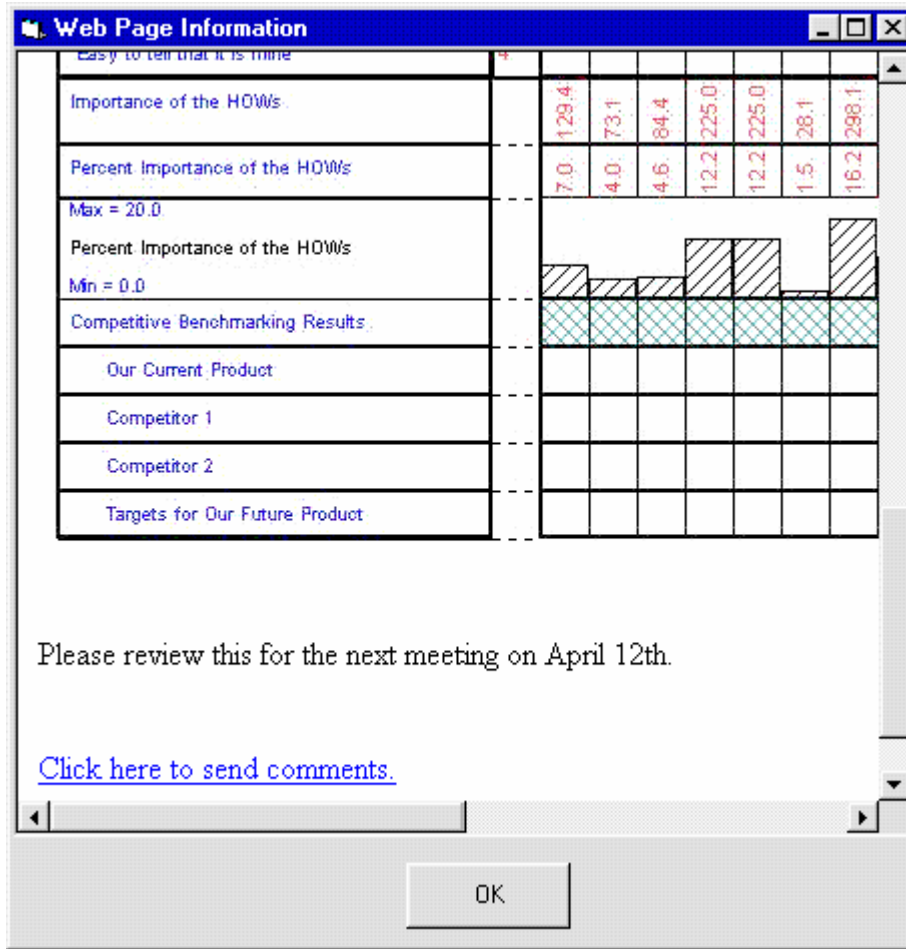
The Web Page Information dialog box that appears allows you to add the following information to the web page:

- Title that will be shown at the top of the web page
- Notes that will be placed beneath the chart on the web page
- Email link that others can click on to send comments back to you



The image shows a dialog box titled "Web Page Information". It contains three text input fields and a checked checkbox. The first field is labeled "Title to be Shown on Web Page:" and contains the text "Relationship Matrix". The second field is labeled "Notes to Place Beneath the Picture:" and contains the text "Please review this for the next meeting on April 12th.". The third field is labeled "Email Address for Comments to be Returned To:" and contains the text "myemail@mycompany.com". Below the fields is a checkbox labeled "Preview Resulting Web Page" which is checked. At the bottom of the dialog box are two buttons: "Cancel" and "OK".

Type the above information into the dialog box. If there is information that you do not wish to include, simply leave the area blank. Then click on the OK button. You will see a preview of the chart web page similar to the following.



Click on the OK button to continue.

The web page that you have created can be emailed to others or made available on a web server.

To email a webpage, you will need to include both the HTML file and the JPEG file (the \*.jpg image file that was created).

To make the web page available on a webserver, you will need to place the HTML file and the JPEG file in the same directory.

## How to include a chart in another document

To include a chart in a document created by another application, such as a word processor or a presentation program:

- Double-click on the desired Matrix block in the Roadmap to open the Matrix window.
- Select View-As Chart from the menubar.
- Select File-Export Graphics-To Windows Metafile from the menubar.
- Type in a name for the file and click on the Save button.
- In the application where you are developing the document, select a command similar to Insert-Picture and locate the file that you have just created. (Microsoft Office products use the command Insert-Picture.)

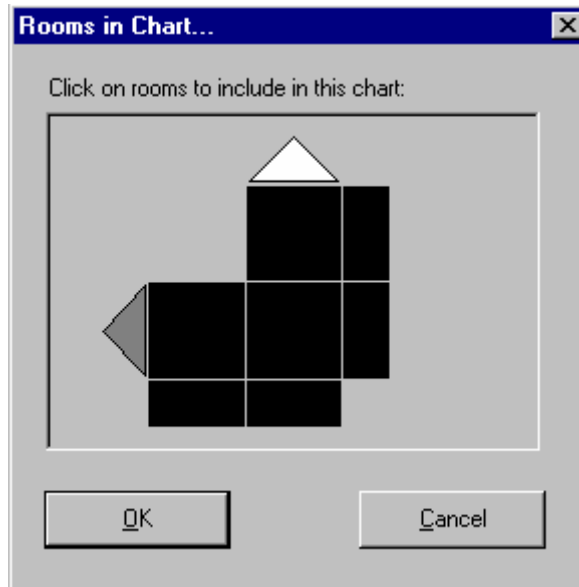
As an alternative to the Windows Metafile format, you can also create a JPEG image of the chart. To do this, follow the instructions in the previous section, "How to create a web page of a chart". This process creates both an HTML file and a JPEG image. Use the resulting JPEG image in your document.

## How to specify which data areas to include in a chart

To specify which data areas (Rooms) to include in a chart:

- Double-click on the corresponding Matrix block in the Roadmap to open the Matrix window.
- Select View-Rooms in Chart from the menubar.

This will bring up the Rooms in Chart dialog box. This dialog box allows you to select which Rooms will be displayed in the Chart View. Input and Output Lists, Relationship data, Related Data Entries, and Roof Matrices all reside in different Rooms.



Black areas indicate data that will be included in the chart. White areas indicate data that will not be included in the chart.

Gray areas indicate data that is not available to include in the chart. This will most likely be the side roof or top roof areas. In order to include roof data in the chart, you must first create a matrix to hold the roof relationships. For instructions, see "How to create a roof matrix" in "Chapter 6: Matrix How To's".

### **How to add calculation to chart**

For information about how to add a calculation to a chart, see "How to setup a calculation" in "Chapter 5: Related Data How To's".

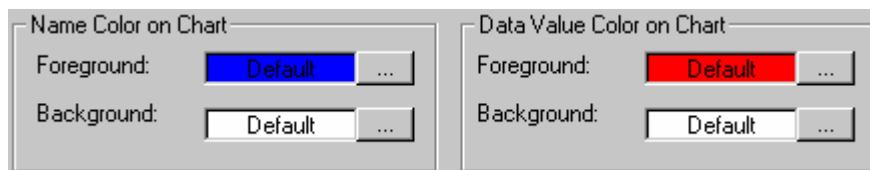
### **How to add graph to chart**

For information about how to add a graph to a chart, see "How to setup a graph" in "Chapter 5: Related Data How To's".

## How to set foreground and background colors of rows or columns

To set the foreground and background colors of a row or column:

- Double-click on the entry name in the List window or Matrix window spreadsheet. This will open the More About Entry or the More About Related Data dialog box.
- Click on the Format tab.



The Name Color on Chart group box allows you to define the foreground and background colors of the row or column name. The selected colors apply to the Chart View only.

To modify the name foreground or background colors, select the “...” button next to the desired color option. A Color dialog box will appear. Please refer to the end of this section for a description of the Color dialog box

The Data Value Color on Chart group box allows you to define the foreground and background colors of the values for the selected Entry.

To modify the Data Value foreground or background colors, select the “...” button next to the desired color option. A Color dialog box will appear. Please refer to the end of this section for a description of the Color dialog box.

**Hint:** The Data Value foreground and background colors can be defined for individual data cells. To do this, double click on the cell and select the desired colors in the More About Cell dialog box. To set the colors for a group of cells, drag across the desired cells to select them. Then right click on the area and select Properties from the pop-up menu.

The Reset to Default Colors button allows you to apply the defined default colors. A label “Default” identifies that the default color will be used.

Hint: The default colors can be defined using the Format - Chart menu option.

The Color dialog box allows you to select either a Basic or Custom color. Custom colors can be created by selecting an existing custom color button and pressing the Define Custom Colors >> button

## **How to zoom in or out of a chart**

To zoom in or out of a chart:

- Double-click on the corresponding Matrix block in the Roadmap to open the Matrix window.
- Select View-As Chart from the menu.
- Select View-Zoom from the menu.

The View - Zoom menu option allows you to rescale the chart within the Matrix window. You can select one of the following Zoom options: 10%, 25%, 50%, 75%, 100%, 150%, or 200%. The larger zoom percentages can be useful when viewing the chart from a distance or when projecting the screen image from an overhead projector.

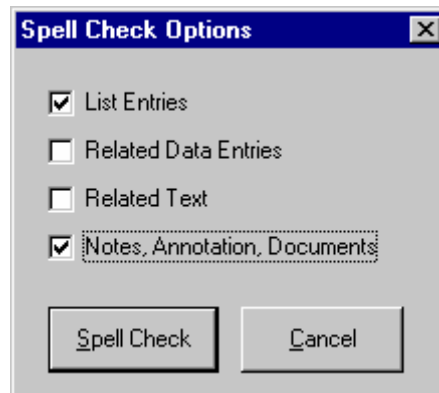
## Chapter 8: General How To's

### How to spell check your text

All of the information in your Capture file can be spell checked and corrected. To run a spell check on the information:

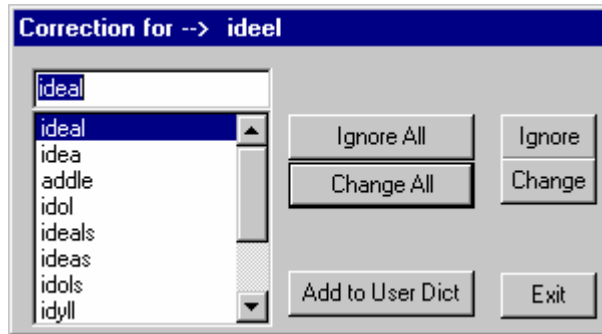
- Select Tools - Spell Check from the menu.

This will open the Spell Check Options dialog box. Select the desired items to be spell checked and click on the Spell Check button.



You will also see Spell Check buttons in many of the Capture dialog boxes. When you click on a Spell Check button, all text fields within that dialog box will be checked for correct spelling.

If any unrecognized words are found, the Correction for myword dialog box will appear, where myword is the unrecognized word.



If you wish to replace the word, you may select one of the listed choices or type in the desired replacement word in the edit area at the top of the dialog box.

To replace just this one occurrence of myword, click on the Change button. To replace all occurrences of myword in the file, click on the Change All button.

To add the replacement word to your dictionary for future spell checks, click on the Add to User Dict button.

To leave this occurrence of myword as is, click on the Ignore button. To leave all occurrences of myword as is, click on the Ignore All button.

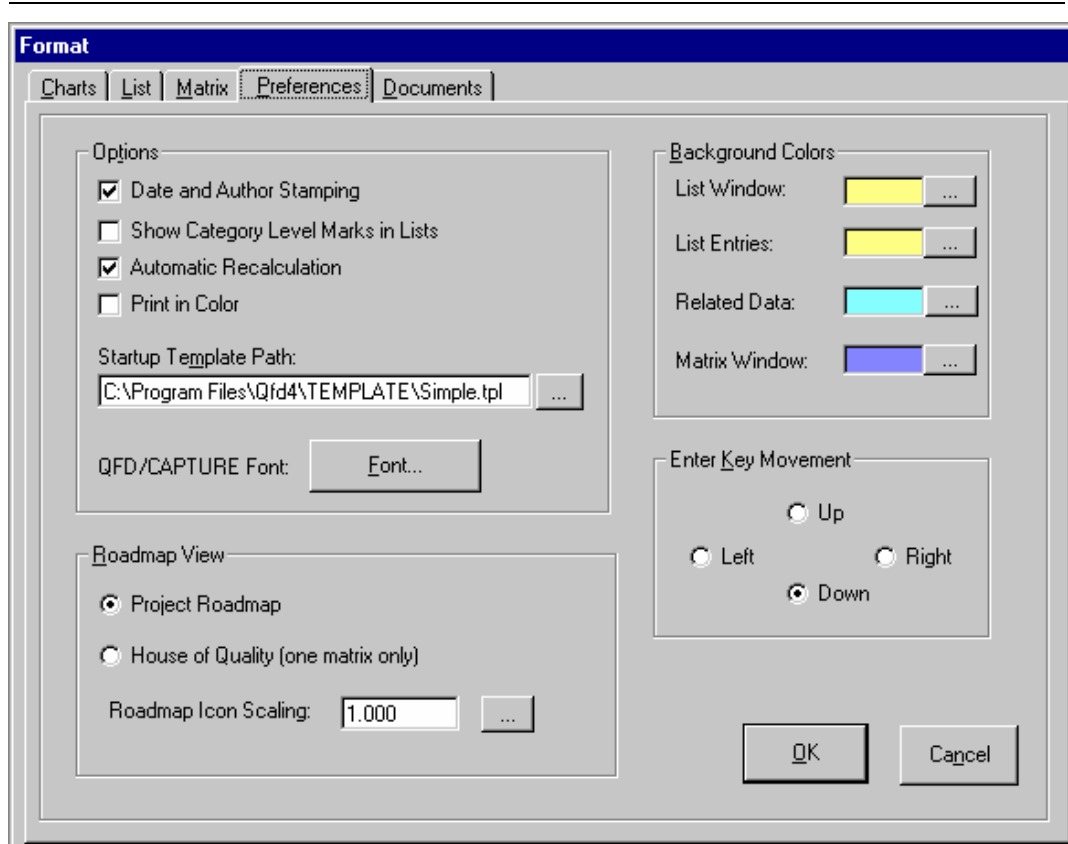
To exit from the Spell Check process, click on the Exit button.

## **How to set general software preferences**

There are several settings that will allow you to customize your Capture environment. To set your preferences for these settings:

- Select Format - Preferences from the menu.

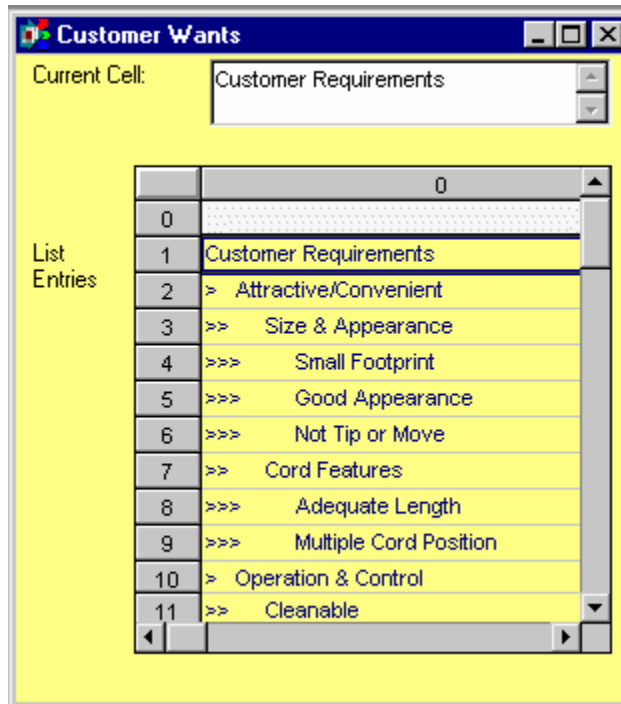
This menu option will open the Preferences tab of the Format dialog box. The Preferences tab includes four general areas: Options, Roadmap View, Background Colors, and Enter Key Movement.



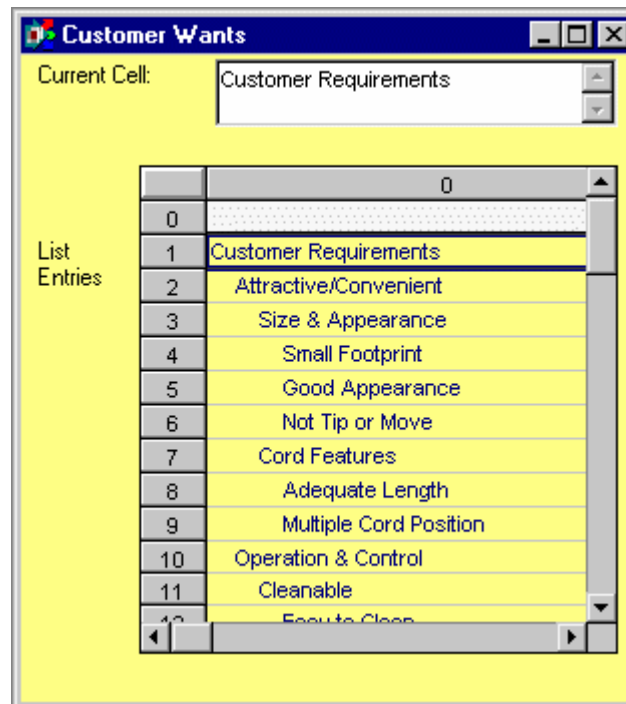
The Options group box contains the following:

QFDcapture includes the **Date and Author Stamping** checkbox. This allows you to activate the audit trail capability which records the date and author's name in all note entries within a project. For more information, please refer to "How to provide an audit trail for data" in "Chapter 9: Advanced Features".

The **Show Category Level Marks in Lists** checkbox allows you to turn on or off the display of category level marks (“>”) in the List window, Matrix Spreadsheet view and Matrix Relationship Tree view. If Level Marks are turned off, indentation will be used to show categorization. The figures below show the 2 different display formats.



Level Marks On



Level Marks Off

The **Automatic Recalculation** checkbox allows you to turn on or off automatic recalculation of all calculated entries after each data entry. If this is turned on, all calculation results will be immediately recalculated whenever data is changed that could affect the results. If this option is turned off, calculation results will only be recalculated when you select Tools-Recalculate Now from the menu.

The **Print in Color** checkbox allows you to turn on or off color printing. If this is turned off, printing will be in Black and White mode, where all non-white entities are printed in black. If this option is turned on, printing will be in either color or grayscale, depending on your printer.

The **Startup Template Path** allows you to specify a template file that will always be loaded into the Roadmap when you startup your Capture software. Click on the ... button under Startup Template Path to locate a template file. This button will open the Browse for Startup Template dialog box.

The **Font** option allows you to select the font that will be used in all data entry areas. These areas include text edit areas and spreadsheet contents. To select a font, click on the Font button.

The **Roadmap View** area allows you to specify the characteristics of the Roadmap window. (This is only available in QFDcapture.)

The display format can be either icon-based (with a box for each List, Matrix and Document) or a House of Quality outline.

Select the Project Roadmap option to use the icon-based display format. This format provides display icons for each Document, List, and Matrix. Lines of input and output are shown between the Lists and Matrices.

Select the House of Quality option to use the House of Quality outline display format. The information contained in the List and Matrix windows are available by clicking on the corresponding Rooms. The background color of each Room in the House of Quality is defined in the Background Color group box.

If a file's data content does not match the House of Quality format (i.e.: it contains more than one Matrix), QFDcapture will automatically use the Project Roadmap format for that file.

**Roadmap Icon Scaling** value can be used to change the size of the boxes in the Roadmap. For more information about this feature, see "How to resize boxes on the roadmap" in "Chapter 3: Roadmap How To's".

The **Background Colors** area allows you to select the background colors for the List Window, List Entries, Related Data Entries and the Matrix Window. The current background colors are shown to the right of each item.

To modify any of the background colors, click on the ... button next to that option. A Color dialog box will appear.

The **Enter Key Movement** area allows you to select the direction of movement when you press the "Enter" key on the keyboard. Select either Left, Right, Up or Down. The default is Down. The Enter Key direction

of movement applies only to navigation in spreadsheet views.

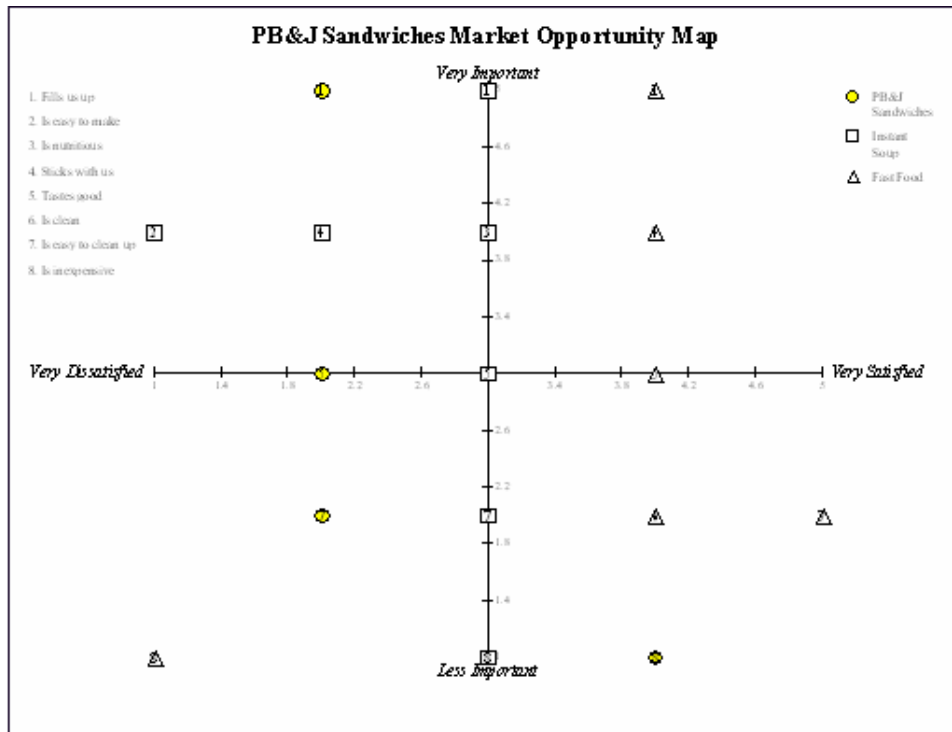
## Chapter 9: Advanced Features

The advanced features in this chapter are only supported in QFDcapture.

### How to create a market opportunity map

A Market Opportunity Map is a graph which shows both the importance of customer requirements and customer satisfaction levels. The performance of competitive products or services can be graphed as well. This format can provide many useful insights for the planning and development of your product or service. It can identify the areas with the most opportunity for improvement in customer satisfaction as well as the areas with the best opportunity to surpass your competitors.

The following is a sample Market Opportunity Map:



You can see that the vertical axis represents Importance values of the requirements. Satisfaction ratings are represented by the horizontal axis.

Requirements which fall in the lower left quadrant of the graph have both a low importance and low satisfaction level to customers. Since they do have low importance, it is probably not worth addressing improvement of their satisfaction levels.

The upper left quadrant indicates requirements which are high in importance and low in satisfaction. These are the areas where the greatest improvement is needed - thus the greatest market opportunity.

The upper right quadrant indicates requirements which are high in importance and high in satisfaction. Some improvement may be warranted in these areas if the competition has a higher satisfaction rating.

The lower right quadrant indicates requirements which are low in importance and high in satisfaction. These are areas to which you may decide to devote fewer resources.

The following figure illustrates the condition indicated when points are graphed in each quadrant.

<b>Market Opportunity</b>	<b>Product Requirement</b>
<b>Inconsequential</b>	<b>Resource Reallocation</b>

Indicated Condition for Each Quadrant of the Graph

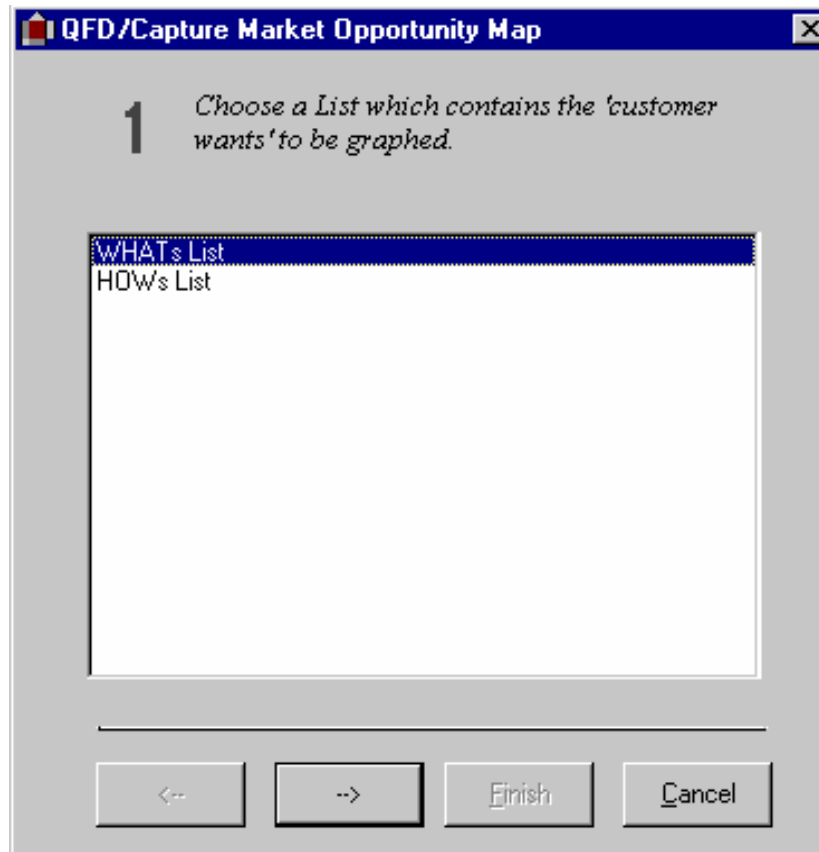
QFDcapture uses Microsoft Powerpoint to generate the graphics for this report. You must have Powerpoint 7.0 or higher installed on your system to use this feature.

To generate a Market Opportunity Map report:

- Select Tools - Add-Ins - Market Opportunity Map from the menu.

Note: If this is the first time that you have selected the Tools menu in the current QFDcapture session, it may take several seconds to bring up the menu. QFDcapture is busy determining which add-ins are on your system.

The Market Opportunity Map window will appear showing a list of all of the Lists in the currently loaded project. Select a List containing the requirements that you would like to graph. Then press the arrow button to go to the next step.



Select the item in the list which contains the Importance values to graph on the vertical axis. Then press the arrow button to go to the next step.

Select the item in the list which contains the Satisfaction ratings of your current product or benchmark product to graph on the horizontal axis. Then press the arrow button to go to the next step.

Select the items in the list which contain the Satisfaction ratings of your competitors products to graph against the horizontal axis. Then press the arrow button to go to the next step.

The low and high values for each axis of the graph are shown based on the actual data contained in the entries that you selected previously. You may change any of these values if you wish. For example, you may want your scale to start from 0 instead of 1. Then press the arrow button to go to the next step.

The entries that you had selected as representations of your current or benchmark product and your competitors' products are shown on the left. A particular type of symbol will be used to graph the data points for each product. As you select a product on the left, you can then select the symbol to be used for its data points on the right. When you are done, press the Finish button to generate the Market Opportunity Map report.

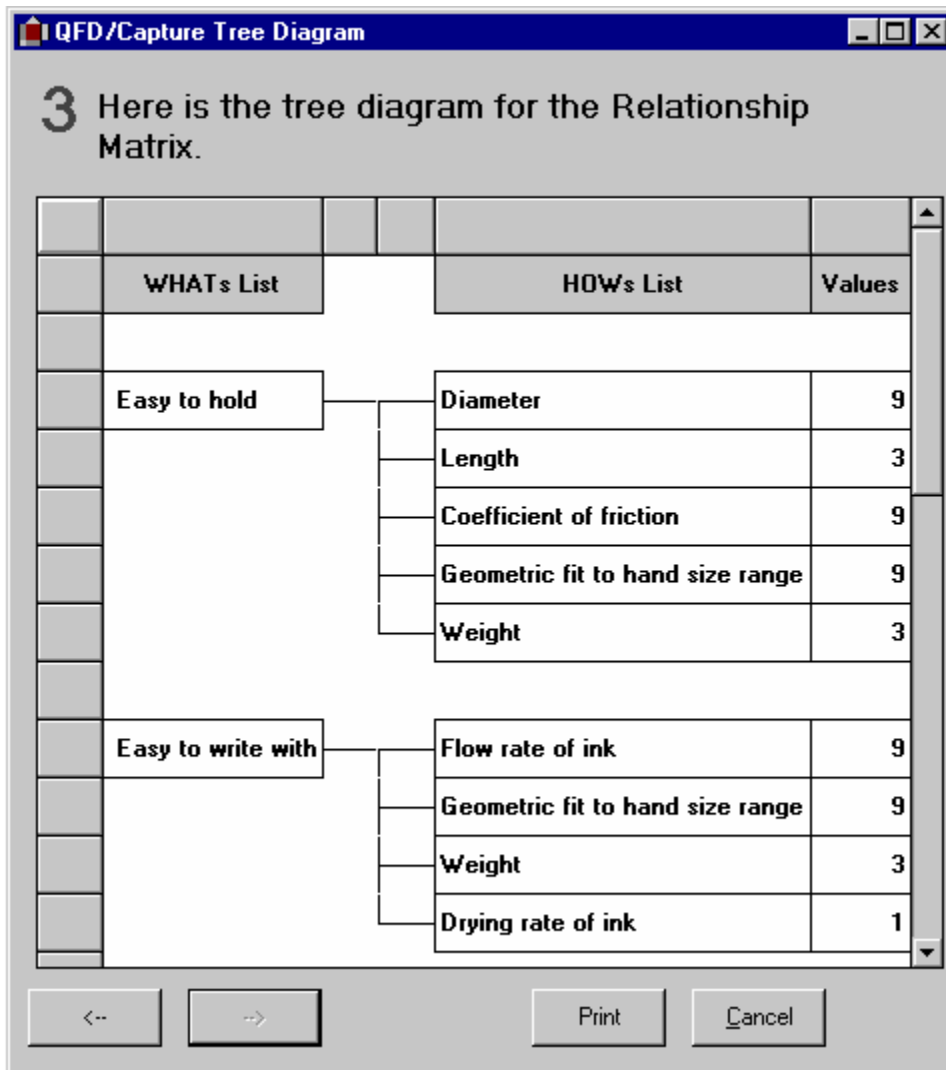
Note: Microsoft Powerpoint version 7 or higher is used to draw the graph. If you have an older version of Powerpoint or do not have Powerpoint on your system, then you will see an error message.

Microsoft Powerpoint will be opened and the graph will be built within a Powerpoint document. A legend will be shown indicating the number corresponding to each requirement that has been graphed. Another legend will be shown indicating what each symbol represents.

## How to create a tree diagram

A Tree Diagram is an alternate representation of the information in a matrix. It groups all of the relationships with one entry into a tree and branch format. It can be used to help visualize the completeness of coverage of the input rows of a matrix. In other words, do you have adequate measures defined to insure that the requirements will be met?

The following figure illustrates an example of a Tree Diagram.

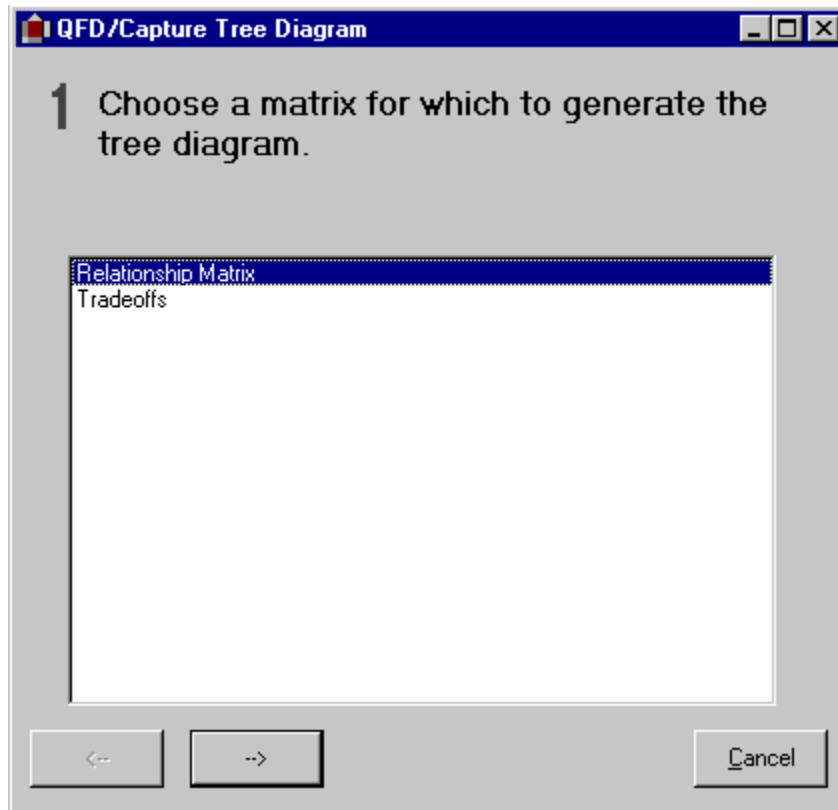


To create a Tree Diagram:

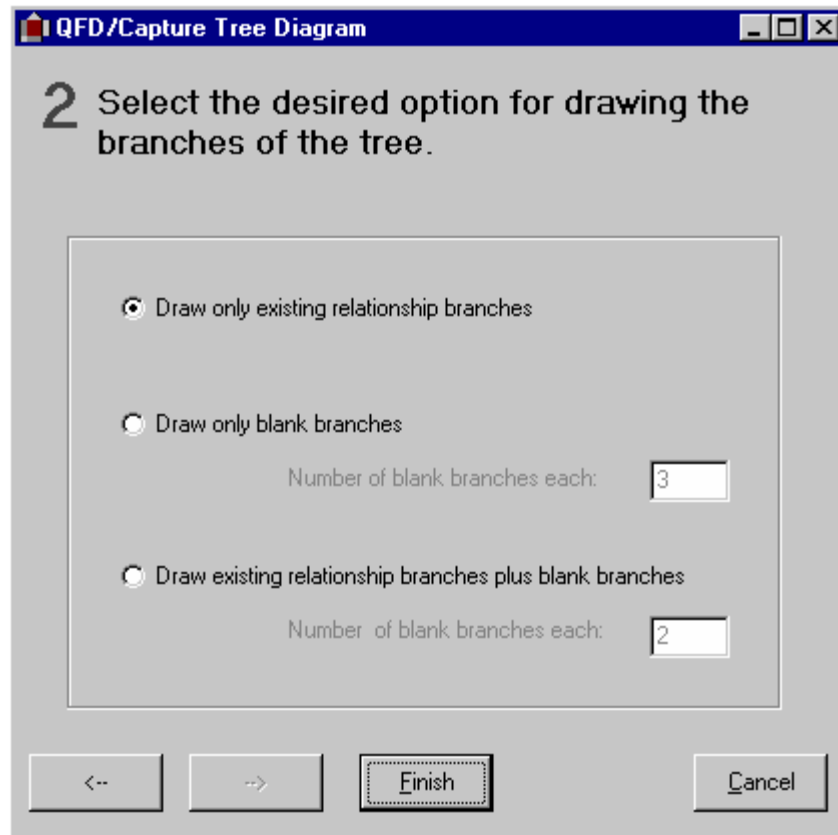
- Select Tools - Add-Ins - Tree Diagram from the menu.

Note: If this is the first time that you have selected the Tools menu in the current QFDcapture session, it may take several seconds to bring up the menu. QFDcapture is busy determining which add-ins are on your system.

The Tree Diagram window will appear showing a list of all of the matrices in the currently loaded project. Select a matrix for which to generate the tree diagram.



Then press the right arrow button to go to the next step.



There are three options to select from for determining the content of the tree diagram. The default, which is automatically selected for you, is Draw only existing relationship branches. This means that for each row of the matrix that has relationships in it, a branch will be drawn for each of those existing relationships. Use this option to generate a report of existing relationships.

If you want to generate a blank tree for brainstorming or data entry, then select Draw only blank branches. For each row of the matrix a tree will be drawn with the number of branches specified in Number of blank branches each.

If you want to generate a tree including existing relationships but also adding blank branches for additional brainstorming or data entry, then select Draw existing relationship branches plus blank branches. For each

row of the matrix a tree will be drawn including existing relationship branches plus the number of branches specified in Number of blank branches each.

When you have selected the desired option, then click on the Finish button. The resulting tree diagram will be shown in the window. To see more of the diagram, you can resize the window and scroll through it.

To print the tree diagram, click on the Print button. The Windows Print dialog box will appear allowing you to specify printing options.

To change the tree diagram options or to select a different matrix, press the left arrow button to move back to previous steps. To close the Tree Diagram window, click on the Cancel button or the X close button in the upper right hand corner of the window.

## How to generate a customer survey

The importance of requirements to customers and the customers' perceptions are often gathered through surveys, which require the person being surveyed to identify the relative importance and perception of each of the requirements. This information is used in the QFD process to prioritize the requirements and later to deploy or translate that prioritization to the columns of the matrix.

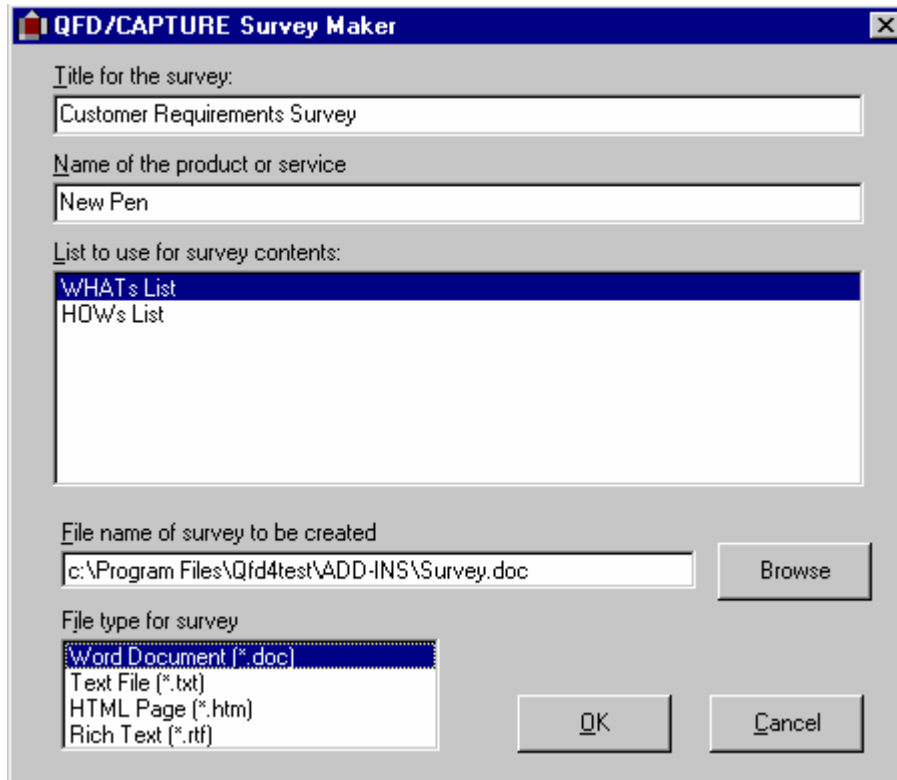
Once a preliminary List of requirements has been entered into a QFDcapture Project, you can generate such a customer survey based on that List. The resulting survey will have several sections and can be modified or customized by editing the survey skeleton file called "qfcdsurv.txt" provided in the "Add-ins" sub-directory under the QFDcapture directory.

To create a customer survey:

- Select Tools - Add-ins - Survey Maker from the menu.

Note: If this is the first time that you have selected the Tools menu in the current QFDcapture session, it may take several seconds to bring up the menu. QFDcapture is busy determining which add-ins are on your system.

The QFDcapture Survey Maker window will appear.



Enter a title for the survey to appear at the top of the document in the Title for the survey area. Enter the product or service name in the Name of the product or service area. Select the List which will provide the source of the paired comparison fields from the List to use for survey contents list. To specify a file type for the resulting survey, pick the ... (Browse) button.

The survey file type options are:

- Microsoft Word document (\*.doc)
- Text file (\*.txt)
- HTML Web page file (\*.htm)
- Rich Text Format file (\*.rtf).

To generate the survey, click on the OK button. Based on the file format

that you had selected, one of the following will occur:

- If you selected Microsoft Word Document, then Microsoft Word will open and start building the survey. You will see the building process as it occurs. This process may take a minute.
- If you selected Text File, then the Notepad application will open and show the resulting survey.
- If you selected HTML Page, then your Web browser application will open and show the resulting survey.
- If you selected Rich Text File, then the Notepad application will open and show the formatted survey.

The surveys that you create can be modified or customized by editing the survey skeleton file called “qfdcsurv.txt” provided in the “Add-ins” sub-directory under the QFDcapture directory.

There are several keywords which you can use in the skeleton file to specify the placement of certain types of information. A keyword will be surrounded by <> characters. In the resulting survey document, the keyword will perform some formatting function or will be replaced by the designated text or information.

Formatting Keywords are:

- <ALIGN=CENTER> will center justify the paragraph that follows.
- <ALIGN=LEFT> will left justify the paragraph that follows.
- <NEWPAGE> will place a page break at that location in the survey.
- <IGNORE> is used to add comments to the file. Text following this keyword will not appear in the survey.

Content Replacement Keywords are:

- <PROJECT\_TITLE> places the text from “Title for the survey” in this location within the survey.
- <PRODUCT\_NAME> places the text from “Name of the product or service” in this location within the survey.
- <SECTION=my text> creates a section heading in this location within the survey using the text that you specify.
- <SURVEY\_DESCRIPTION> places the list of entry names and place-holders for their descriptions in this location within the survey.
- <SURVEY\_BODY> places the paired comparisons of each entry with each other entry in this location within the survey.
- <SATISFACTION\_RATING> places the table for collecting customer satisfaction ratings in this location within the survey.

## How to merge results from team members

You can merge Lists, Matrices, and Documents from an existing QFDcapture project file into the current QFD project file. This allows different team members to work on different portions of the data and then merge their results together.

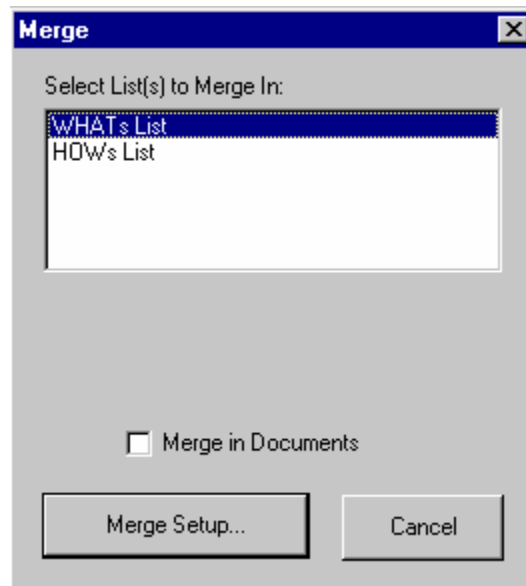
To merge two QFDcapture files together:

- Select the File - Merge menu option.

Warning: Always save your current project file prior to using the Merge menu option. This menu option can drastically change the design and contents of your current project file.

This menu option will open the Merge File dialog box. The Merge File dialog box allows you to select the file from which to obtain the desired Lists, Matrices, and Documents.

Select the desired file and press the Open button to continue. This will open the Merge dialog box. This dialog box allows you to select the desired Lists and Documents to merge into your current file.

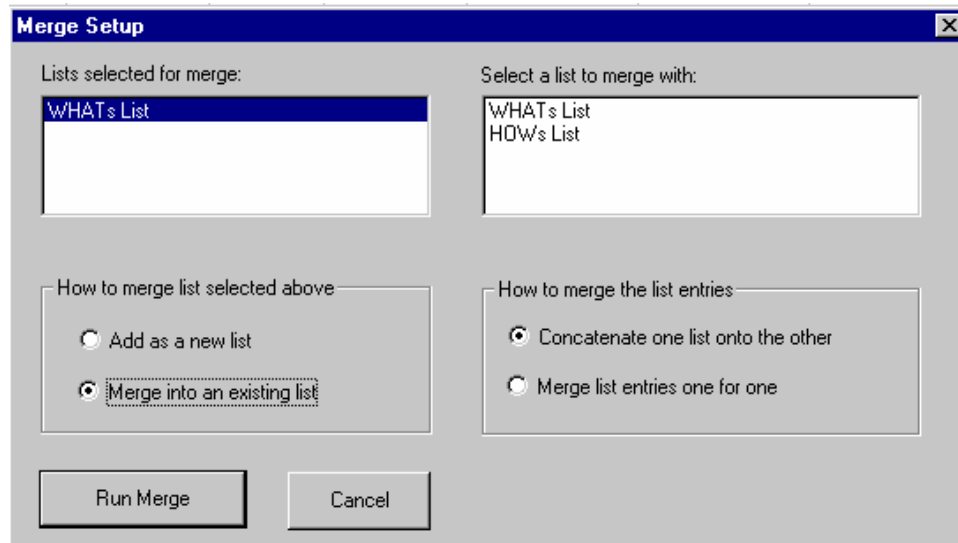


Select one or more Lists from the Select Lists to Merge in list box. To select multiple Lists, use either the Shift or Ctrl keys on the keyboard, while clicking on the desired List. The Shift key provides a continuous selection; whereas, the Ctrl key provides non-continuous selections.

Any Matrices bounded by the selected Lists to Merge will automatically be merged into your current project file. This includes any Roof Matrices.

Documents can optionally be merged into your current project file. Select the Merge in Documents checkbox.

Press the Merge Setup... button to continue. This will open the Merge Setup dialog box. This dialog box allows you to define how the merged Lists will be added to your current project file.



The Lists selected in the Merge dialog box are shown in the Lists selected for merge list box. Complete the following steps for each List in this list box:

1. Select the desired option from the How to merge list selected above group box, either:

- Add as a new list

or

- Merge into an existing list

The Add as a new list option will create a new List in the current project file and paste the contents of the merged List into the new List. Any matrices associated with the merged List will be created in the current project file, provided the other Lists in those Matrices have also been selected for merging.

The Merge into an existing list option will paste the contents of the merged List into an existing List in the current project file. This option will expand the dialog box allowing you to define how the List will be merged.

Note: Complete Steps 2 and 3 if you selected the "Merge into an existing list" option.

2. Select the desired List from the Select a list to merge with list box. This list box contains a list of the Lists from the current project file. The contents of merged List will be pasted into the selected List.

3. Select one of these options from the "How to merge the list entries" group box:

- Concatenate one list onto the other
- Merge list entries one for one

The "Concatenate one list onto the other" option will append the List Entries of the merged List onto the end of the current project file's selected List.

The "Merge list entries one for one" option will insert the data associated with the merged List into the current project file's selected List.

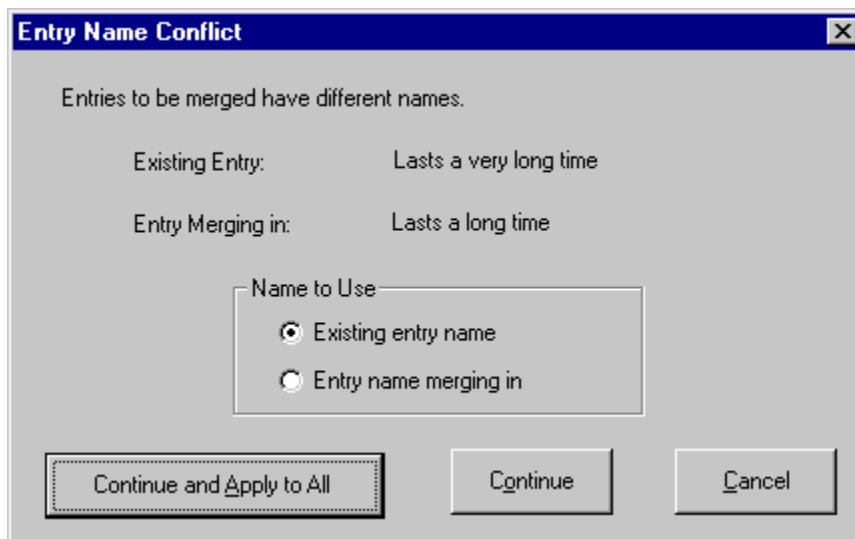
4. Repeat steps 1 through 3 for each List in the Lists selected for merge list box.

Hint: The Merge list entries one for one option is primarily used when the merge and destination Lists have identical List and Related Data Entries. Thus, in this case, Merge will overwrite the destination List's Related Data Values and any defined relationship values.

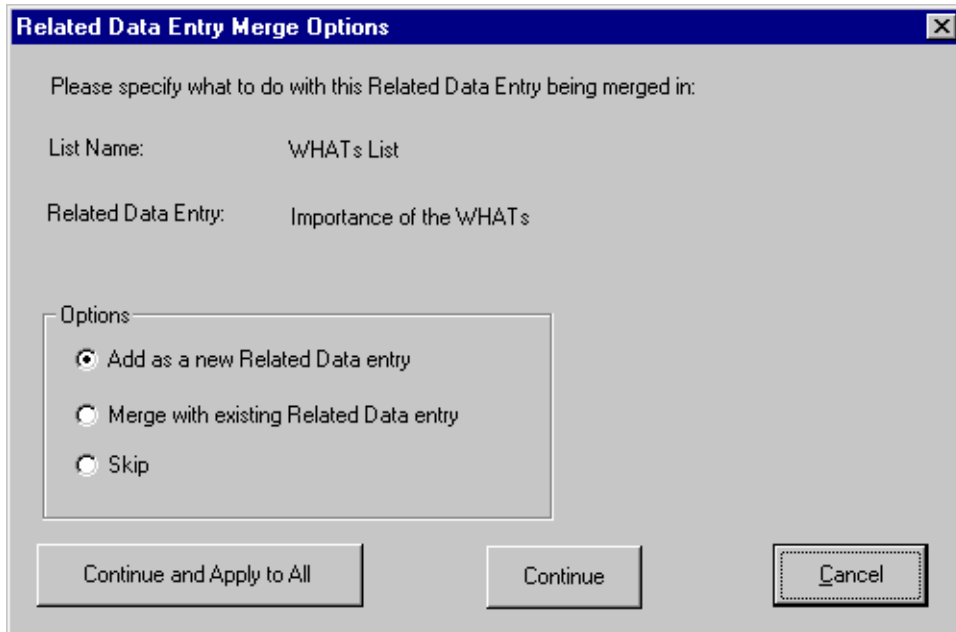
After you have completed the steps 1 through 4 for each List in the Lists selected for merge list box, press the Run Merge push button.

If you selected "Merge list entries one for one" for any list, you may see the Entry name conflict dialog box. This dialog box will be shown if the List Entry names from the merged List do not match the List Entry names from the destination List. To resolve the conflict, select either:

- Use Existing entry name
- or
- Use Entry name merging in.



If you have selected “Merge into an existing list” and there is Related Data associated with the List being merged in, you will see the “Related Data Entry Merge Options” dialog box.



This dialog box allows you to specify whether to add each Related Data Entry as a new column, merge its data with an existing Related Data Entry, or to skip it. Select the desired option and click on one of these buttons:

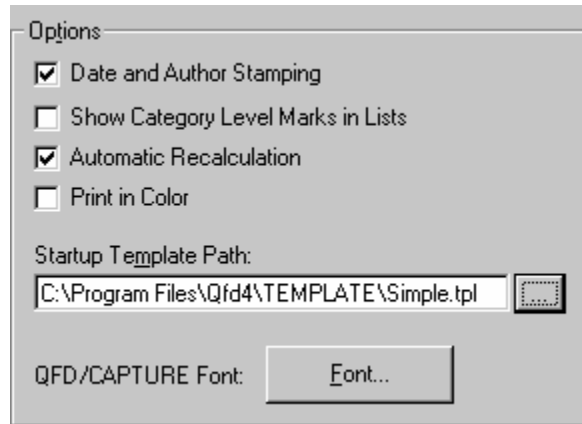
- Continue and Apply to All will apply your selected option to all Related Data Entries, with no further prompts.
- Continue will apply your selected option and prompt you for the next Related Data Entry.
- Cancel cancels the merge process for the current List.

The Merge process may take a few minutes depending on the amount of data being merged. The wait cursor indicates that the Merge is still in progress. Boxes for the added Lists, Matrices, and Documents should now be shown on the Roadmap.

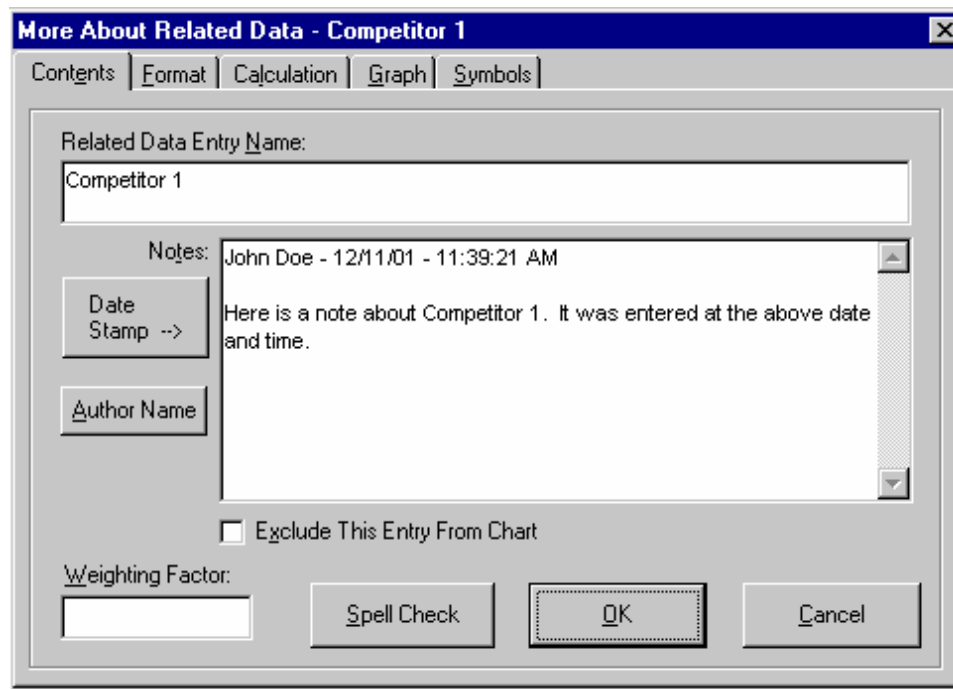
## How to provide an audit trail for data

There is an option available to record the date and author name with each update to notes for an entry or data cell. To turn this option on:

- Select Format-Preferences from the menu.
- Select the Date and Author Stamping check box.
- Click on the OK button.



When this option is turned on, every time that you bring up a dialog box with a note edit area, there will be two additional buttons: Date Stamp and Author Name. See the example below.



The first time that you bring up a note dialog box during a QFDcapture session, you will be asked to type your name or initials into the "Author Name" edit box. It is only necessary to do this once during a session. Subsequent accesses to notes will automatically use the name that you had typed in previously (unless you press the Author Name button to change the Author Name).

Every time that you bring up a note dialog box after this, your name, the date and the time will appear at the beginning of the note. You can then type the note contents following the name, date and time.

To include the name and date in an existing note, pick the Date Stamp button. This will add your name, the date and the time to the end of the existing note. You can then type the additional note contents.

To change the Author Name during a QFDcapture session, pick the Author Name button. Then type the new name into the "Author Name" area that appears.

## Chapter 10: Calculation Reference

Capture software supports many different calculations that can be used in the columns or rows of a matrix. These calculations can be used to determine priorities of list entries, average importance values, improvement factors and other important information.

Normally, all calculation results will be recalculated every time that the resulting data comes into view in a window. If Automatic Recalculation has been turned off through the Format-Preferences menu option, then you will have to select Tools-Recalculate Now to force the recalculation to occur.

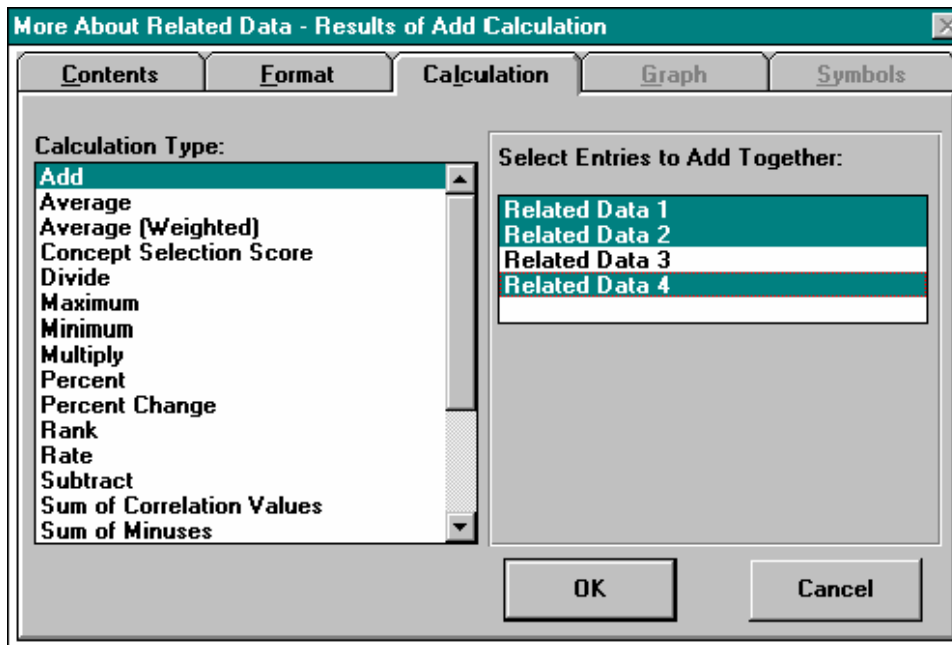
This section will present the following information for each calculation type:

- Description
- Suggested use
- Instructions for setting up the calculation - These instructions refer to selections made in the Calculation Tab of the More About Related Data Entry dialog box. This dialog box is opened by double-clicking on the name of the Related Data Entry in the List spreadsheet.
- Example results

### **Add**

Add computes the sum of the values in the selected Related Data Entries. Select the desired Related Data Entries from the Select Entries to Add list box.

To select multiple Entries, use either the Shift or Ctrl keys on the keyboard, while clicking on the desired Entry. The Shift key provides a continuous selection; whereas, the Ctrl key provides non-continuous selections.



The following Example List illustrates the Add calculation.

	0	1	2	3	4	5
0		Related Data 1	Related Data 2	Related Data 3	Related Data 4	Results of Add Calculation
1	List Entry 1	2.0	4.0	3.0	4.0	10.0
2	List Entry 2	1.0	3.0	4.0	3.0	7.0
3	List Entry 3	3.0	2.0	1.0	4.0	9.0
4	List Entry 4	2.0	3.0	3.0	1.0	6.0
5						

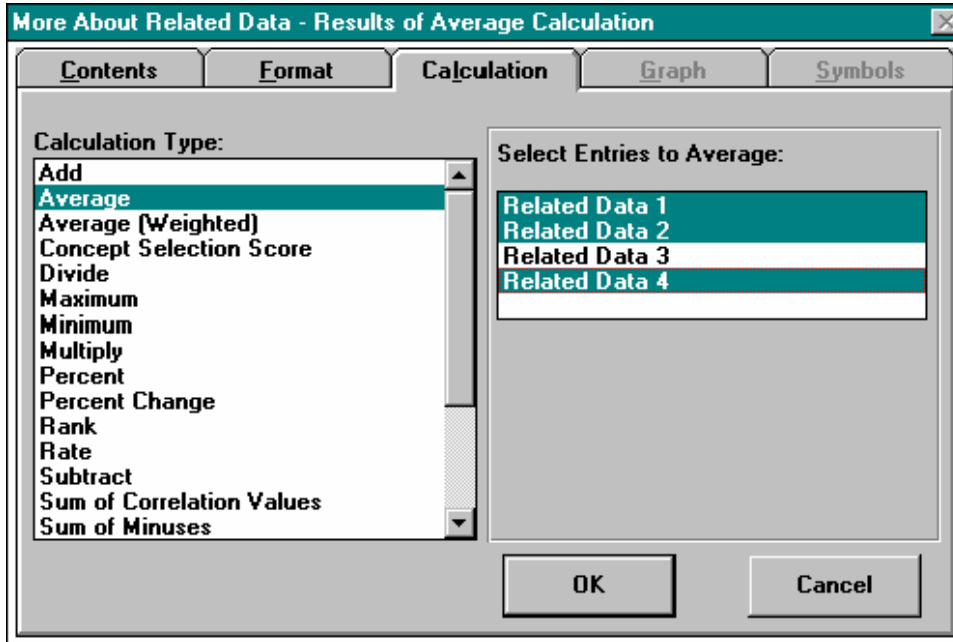
The resultant values shown in column 5 equal the sum of the values contained in columns 1, 2, and 4 for each List Entry.

## Average

Average computes the mean of the values in the selected Related Data Entries. Select the desired Related Data Entries from the Select Entries to Average list box.

To select multiple Entries, use either the Shift or Ctrl keys on the

keyboard, while clicking on the desired Entry. The Shift key provides a continuous selection; whereas, the Ctrl key provides non-continuous selections.



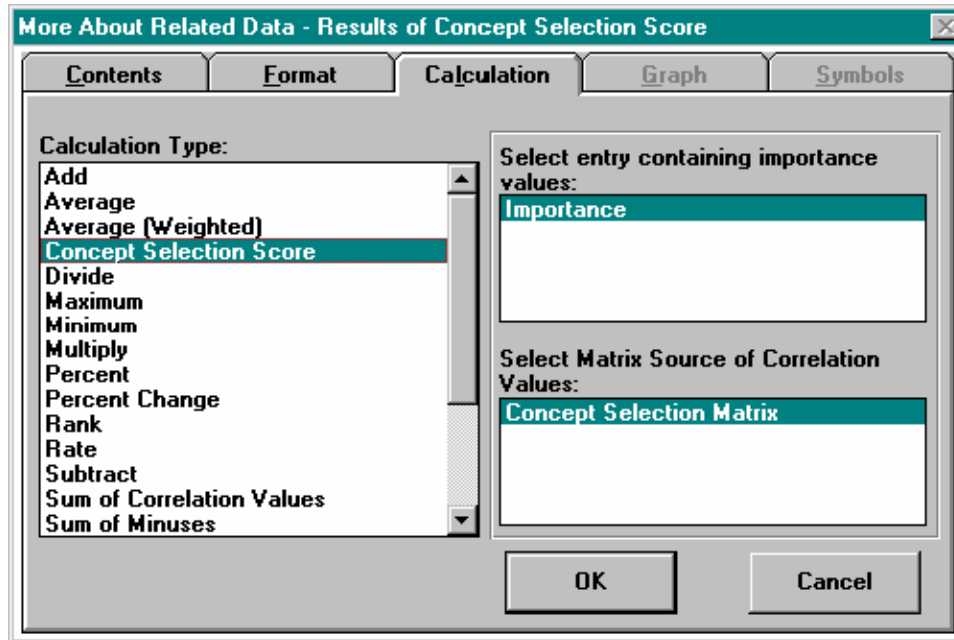
The following List illustrates the Average calculation.

	0	1	2	3	4	5
0		Related Data 1	Related Data 2	Related Data 3	Related Data 4	Results of Average Calculation
1	List Entry 1	2.0	4.0	3.0	4.0	3.3
2	List Entry 2	1.0	1.0	4.0	3.0	1.7
3	List Entry 3	3.0	2.0	1.0	2.0	2.3
4	List Entry 4	4.0	3.0	3.0	1.0	2.7
5						

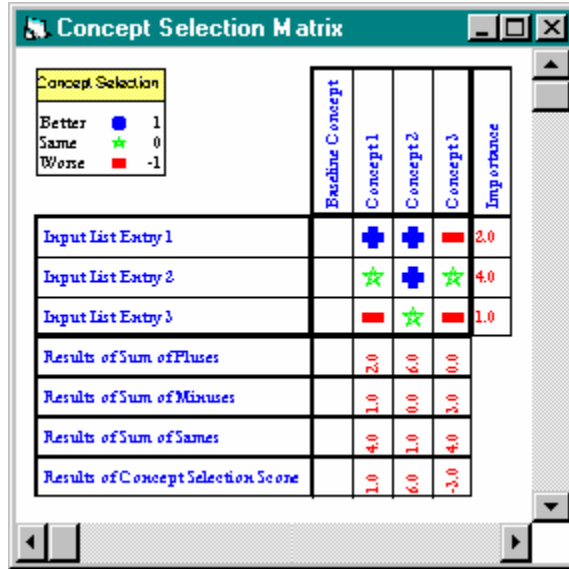
The resultant values shown in column 5 equal the average (mean) of the values contained in columns 1, 2, and 4 for each List Entry.

## Concept Selection Score

Concept Selection Score subtracts the weighted sum of Minuses from the weighted sum of Pluses in a concept selection Matrix to yield an overall rating or score for each Concept. The highest result value indicates the best fit concept. Any values that are positive are better than the baseline concept. Any values that are negative are worse than the baseline concept.



The following Chart illustrates the Concept Selection Score calculation.

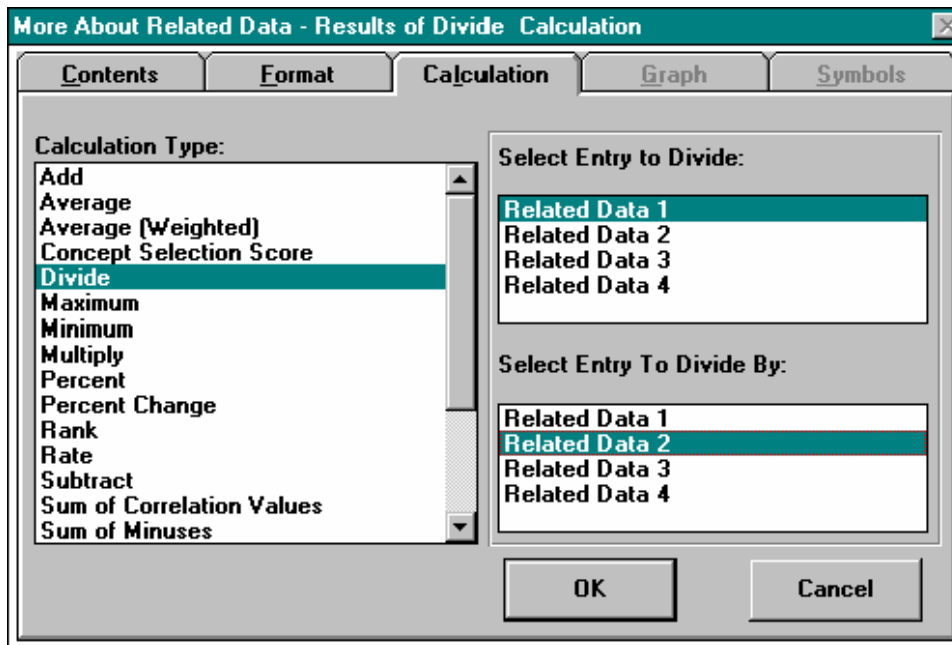


	Baseline Concept	Concept 1	Concept 2	Concept 3	Importance
Input List Entry 1		+	+	-	2.0
Input List Entry 2		*	+	*	4.0
Input List Entry 3		-	*	-	1.0
Results of Sum of Pluses		2.0	6.0	0.0	
Results of Sum of Minuses		1.0	0.0	3.0	
Results of Sum of Same		4.0	1.0	4.0	
Results of Concept Selection Score		1.0	6.0	-3.0	

For this example, the Concept Selection Score of Concept 1 is equal to 1.0 which was obtained by performing the following mathematical calculation:  $[(2.0) * 1.0] + [(1.0) * (-1.0)]$  Notice that Same values are essentially ignored since they do not contribute to the difference between the baseline and the other concepts

## Divide

Divide computes the ratio of the values in one Related Data Entry to the values in another Related Data Entry. Select the desired Related Data Entry from the Select Entry to Divide list box. Then select the desired Related Data Entry from the Select Entry to Divide by list box.



The following List illustrates the Divide calculation.

	0	1	2	3	4	5
0		Related Data 1	Related Data 2	Related Data 3	Related Data 4	Results of Divide Calculation
1	List Entry 1	2.0	4.0	3.0	4.0	0.5
2	List Entry 2	1.0	3.0	4.0	3.0	0.3
3	List Entry 3	3.0	2.0	1.0	4.0	1.5
4	List Entry 4	2.0	3.0	3.0	1.0	0.7
5						

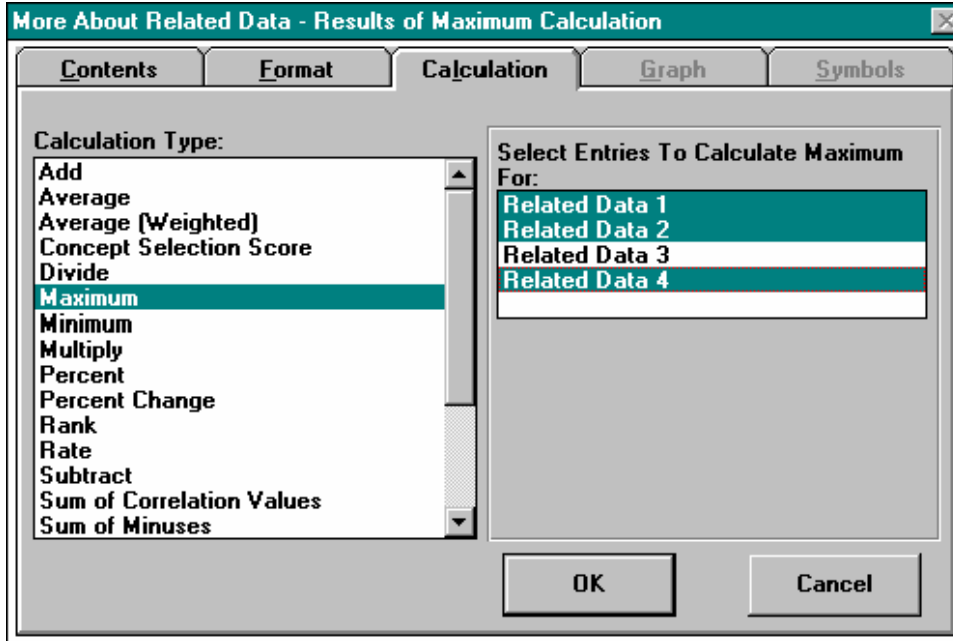
The resultant values shown in column 5 were obtained by dividing the values contained in column 1 by the values contained in column 2 for each List Entry

## Maximum

Maximum determines the maximum value in the selected Related Data Entries for each List Entry. Select the desired Related Data Entries from the Select Entries to Calculate Maximum for list box.

To select multiple Entries, use either the Shift or Ctrl keys on the keyboard, while clicking on the desired Entry. The Shift key provides a continuous selection; whereas, the Ctrl key provides non-continuous selections.

The results of this calculation can be used to determine the “Best in Class” from a set of competitive ratings.



The following List illustrates the Maximum calculation.

	0	1	2	3	4	5
0		Related Data 1	Related Data 2	Related Data 3	Related Data 4	Results of Maximum Calculation
1	List Entry 1	2.0	4.0	3.0	4.0	4.0
2	List Entry 2	1.0	3.0	4.0	3.0	3.0
3	List Entry 3	3.0	2.0	1.0	2.0	3.0
4	List Entry 4	4.0	3.0	3.0	1.0	4.0
5						

The resultant values shown in column 5 are the maximum values

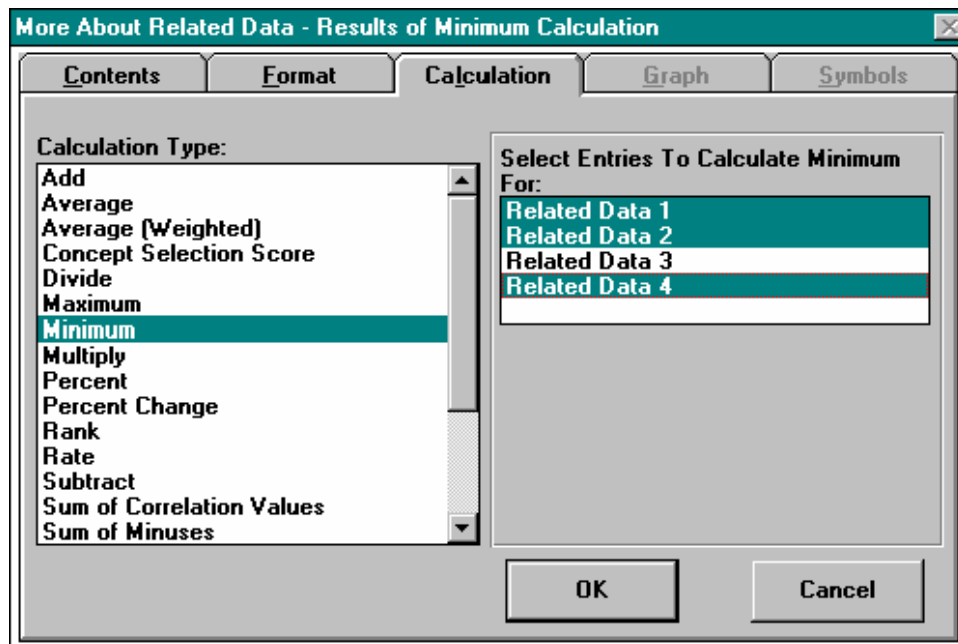
contained in columns 1, 2, and

## Minimum

Minimum determines the minimum value in the selected Related Data Entries for each List Entry. Select the desired Related Data Entries from the Select Entries to Calculate Minimum for list box.

To select multiple Entries, use either the Shift or Ctrl keys on the keyboard, while clicking on the desired Entry. The Shift key provides a continuous selection; whereas, the Ctrl key provides non-continuous selections.

The results of this calculation can be used to determine the “Worst in Class” from a set of competitive ratings.



The following List illustrates the Minimum calculation.

	0	1	2	3	4	5
0		Related Data 1	Related Data 2	Related Data 3	Related Data 4	Results of Minimum Calculation
1	List Entry 1	2.0	4.0	3.0	4.0	2.0
2	List Entry 2	1.0	3.0	4.0	3.0	1.0
3	List Entry 3	3.0	2.0	1.0	2.0	2.0
4	List Entry 4	4.0	3.0	3.0	1.0	1.0
5						

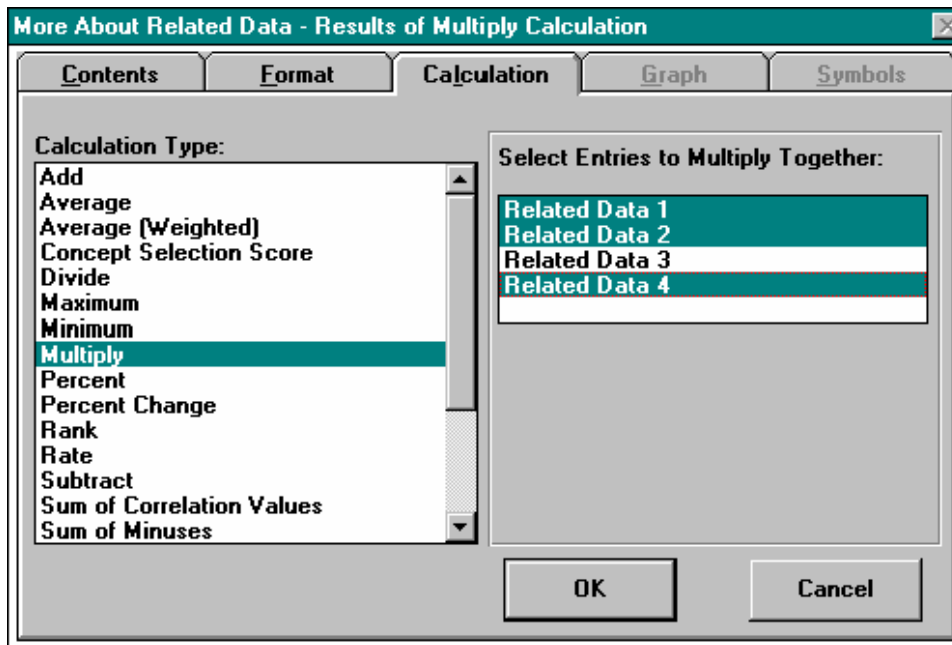
The resultant values shown in column 5 are the minimum values contained in columns 1, 2, and 4 for each List Entry.

## Multiply

Multiply will multiply together the values contained in the selected Related Data Entries. Select the desired Related Data Entries from the Select Entries to Multiply list box.

To select multiple Entries, use either the Shift or Ctrl keys on the keyboard, while clicking on the desired Entry. The Shift key provides a continuous selection; whereas, the Ctrl key provides non-continuous selections.

The results of this calculation can be used to determine an overall importance value for each customer requirement by multiplying customer importance by improvement factor.



The following List illustrates the Multiply calculation.

	0	1	2	3	4	5
0		Related Data 1	Related Data 2	Related Data 3	Related Data 4	Results of Multiply Calculation
1	List Entry 1	2.0	4.0	3.0	4.0	32.0
2	List Entry 2	1.0	1.0	4.0	3.0	3.0
3	List Entry 3	3.0	2.0	1.0	2.0	12.0
4	List Entry 4	4.0	3.0	3.0	1.0	12.0
5						

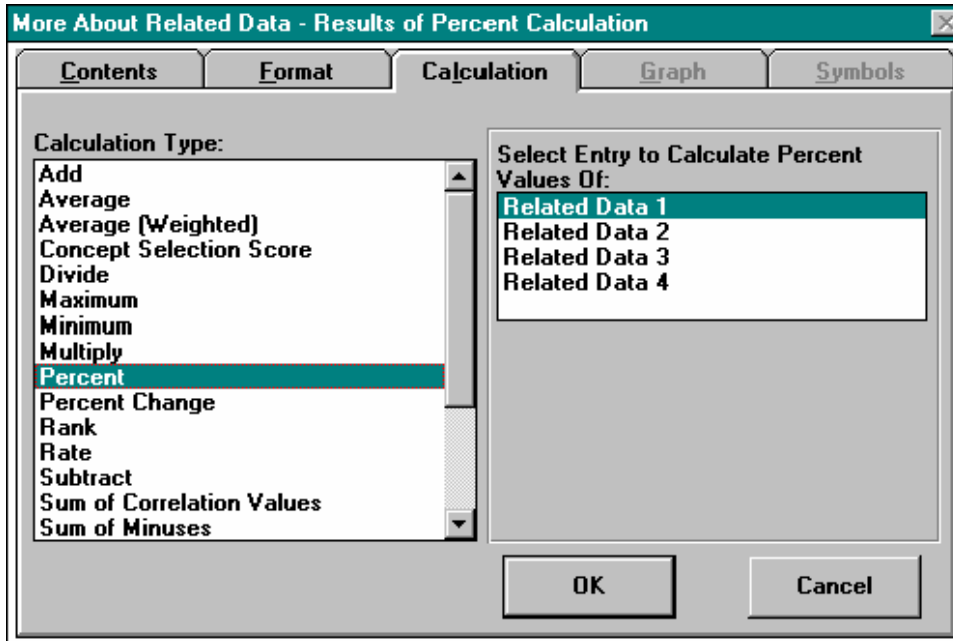
The resultant values shown in column 5 equal the values contained in column 1 multiplied by column 2, and multiplied by column 4 for each List Entry.

## Percent

Percent computes the percent contribution of each data value in a selected Related Data Entry column to its total. A sum total is obtained for the selected Related Data Entry. The value in each data cell is divided by this

sum and multiplied by 100. Select the desired Related Data Entry from the Select Entries to Calculate Percent Values Of list box.

The results of this calculation can be used to determine the percent importance of customer requirements based on the overall importance



The following List illustrates the Percent calculation.

	0	1	2	3	4	5
0		Related Data 1	Related Data 2	Related Data 3	Related Data 4	Results of Percent Calculation
1	List Entry 1	2.0	4.0	3.0	4.0	20.0
2	List Entry 2	1.0	3.0	4.0	3.0	10.0
3	List Entry 3	3.0	2.0	1.0	2.0	30.0
4	List Entry 4	4.0	3.0	3.0	1.0	40.0
5						

The resultant values shown in column 5 equal the percent contribution of the values contained in column 1 for each List Entry. For this example, the sum of the values in column 1 equals 10.0; thus, the percent contribution

of List Entry 1 is 2.0 divided by 10.0, which equals 20.0%.

## Percent Change

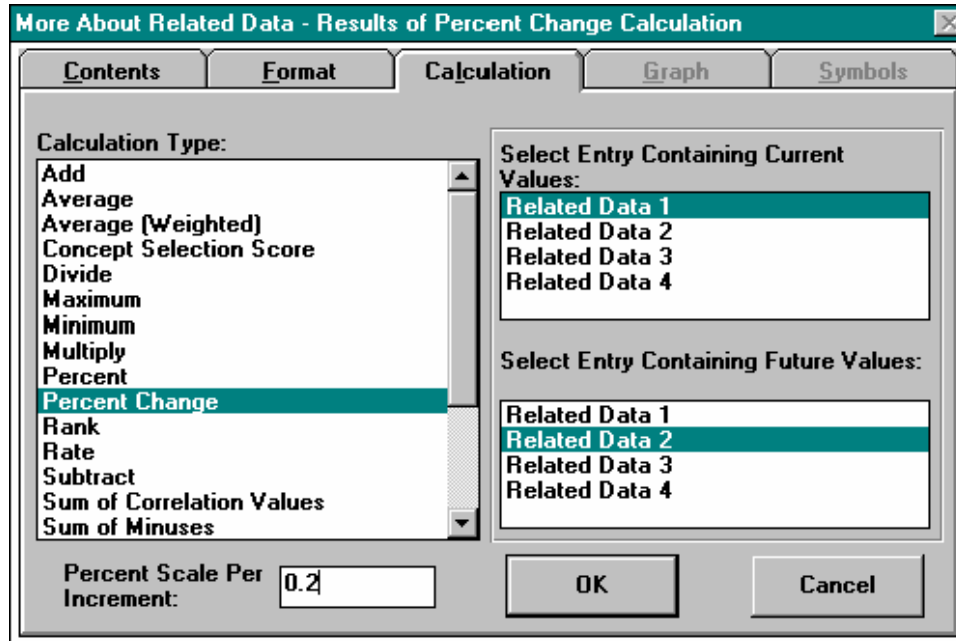
Percent Change computes the fractional difference between the values in two selected Related Data Entries based on a given rating scale.

For example, if on a scale of 1 to 5, your current product satisfaction level is 3 and your goal is 4. The difference between your current product satisfaction level and your goal is 1 out of a scale of 5. Thus, the ratio is 1 of 5, or 0.20. This indicates that you must improve in this area by 20% in order to reach your goal.

Select the desired Related Data Entry from the Select Entry Containing Current Values list box. Then select the desired Related Data Entry from the Select Entry Containing Future Values list box. And finally enter a numeric value in the Percent Scale per Increment field.

To determine the Percent Scale per Increment value, use the following formula: [magnitude of the difference between one rating value and the next] divided by [the maximum rating value]. For example, given a 1 2 3 4 5 rating scale, the result is  $1/5$  or 0.2.

The results of this calculation can be used to determine the Improvement Factor necessary, in each requirement area, to meet the goals which you have set.



The following List illustrates the Percent Change calculation.

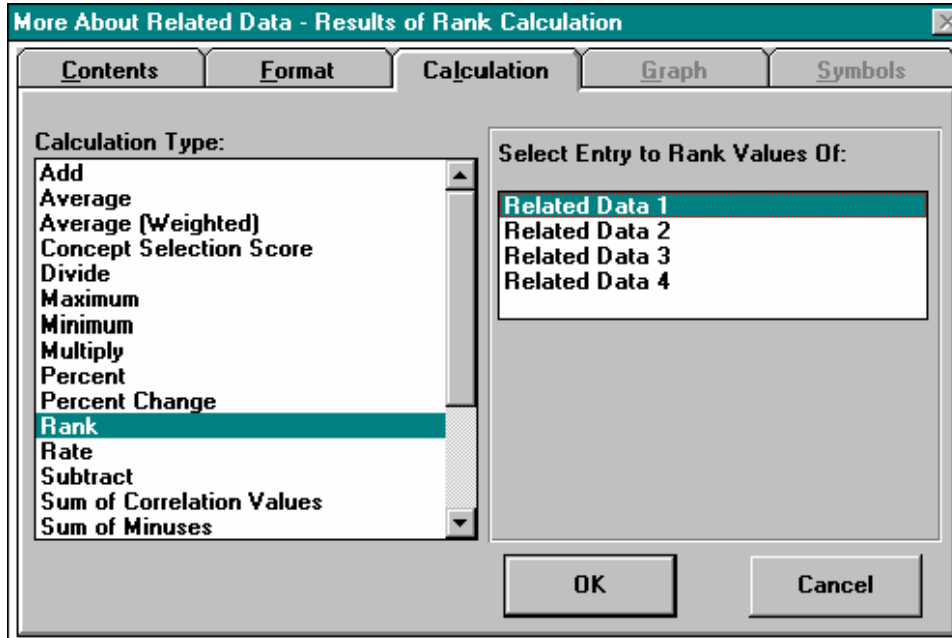
	0	1	2	3	4	5
0		Related Data 1	Related Data 2	Related Data 3	Related Data 4	Results of Percent Change Calculation
1	List Entry 1	2.0	4.0	3.0	4.0	1.4
2	List Entry 2	1.0	1.0	4.0	3.0	1.0
3	List Entry 3	3.0	2.0	1.0	2.0	0.8
4	List Entry 4	4.0	3.0	3.0	1.0	0.8
5						

The resultant values shown in column 5 for each List Entry were obtained using the following Percent Change formula:  $Column\ 5 = 1.00 + (Column\ 2 - Column\ 1) * Scale\ Increment$

A value greater than 1.0 indicates that improvement is needed; whereas, a value less than 1.0 indicates that the current satisfaction level exceeds the target value.

## Rank

Rank computes the ranked position of each data value in a selected Related Data Entry column. The maximum related data entry value will have a rank of 1. Rank values will increase sequentially as the source values decrease. Select the desired Related Data Entry from the Select Entry to Rank Values of list box.



The following List illustrates the Rank calculation.

	0	1	2	3	4	5
0		Related Data 1	Related Data 2	Related Data 3	Related Data 4	Results of Rank Calculation
1	List Entry 1	2.0	4.0	3.0	4.0	3.0
2	List Entry 2	1.0	3.0	4.0	3.0	4.0
3	List Entry 3	3.0	2.0	1.0	2.0	2.0
4	List Entry 4	4.0	3.0	3.0	1.0	1.0
5						

The resultant values shown in column 5 equal the ranked position of the

values contained in column 1 for each List Entry.

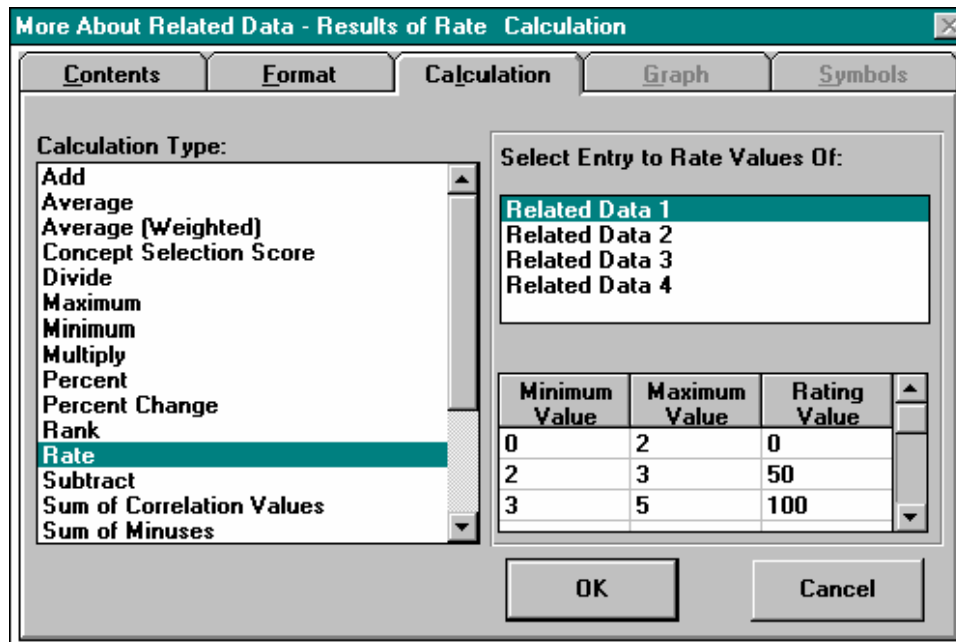
## Rate

Rate computes the position of each data value in a selected Related Data Entry column based on a user defined rating scale. A classic example of this calculation type is a school’s grading scale: A test score of 90 to 100 equals a “A”, a test score of 80 to 89 equals a “B”, etc.

Select the desired Related Data Entry from the Select Entry to Rate Values of list box. Then define the rating scale in the table below the list box.

For each row in the table, if a value falls between the Minimum Value and the Maximum Value, the Rating Value will be the result of the calculation.

The results of this calculation can be used to quantify ranges of data or to convert ranges of data into rating values.



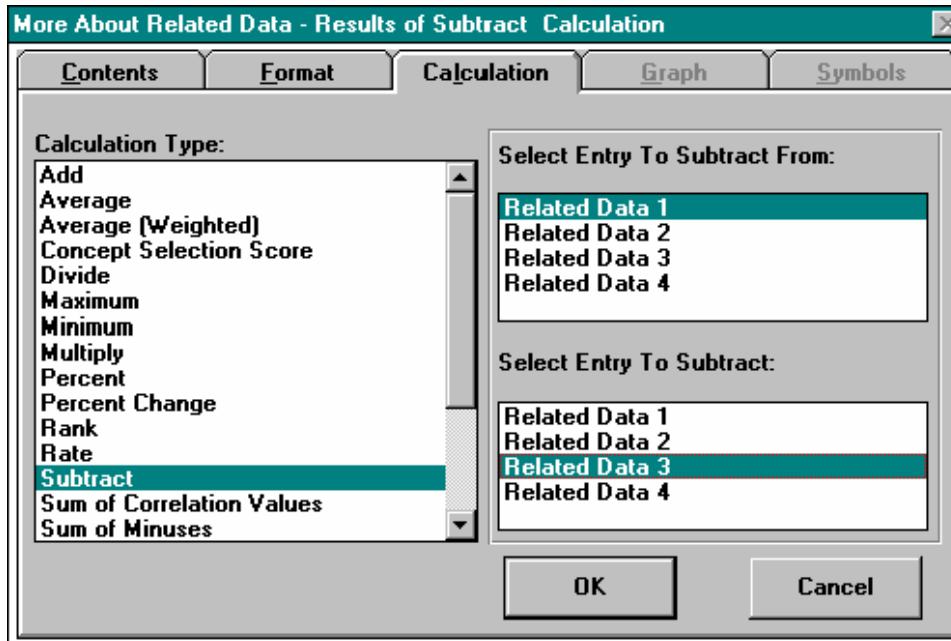
The following List illustrates the Rate calculation.

	0	1	2	3	4	5
0		Related Data 1	Related Data 2	Related Data 3	Related Data 4	Results of Rate Calculation
1	List Entry 1	2.0	4.0	3.0	4.0	50.0
2	List Entry 2	1.0	3.0	4.0	3.0	0.0
3	List Entry 3	3.0	2.0	1.0	4.0	100.0
4	List Entry 4	4.0	3.0	3.0	1.0	100.0
5						

The resultant values shown in column 5 equal the Rating Values from the user defined Rating table based on the values contained in column 1 for each List Entry. In other words, Column 5 value = Rating Value if Minimum Value < Column 1 Data Value < Maximum Value.

## Subtract

Subtract computes the difference between the values in two selected Related Data Entry columns. Select the desired Related Data Entry from the Select entry to subtract from list box. Then select the desired Related Data Entry from the Select entry to subtract list box



The following List illustrates the Subtract calculation.

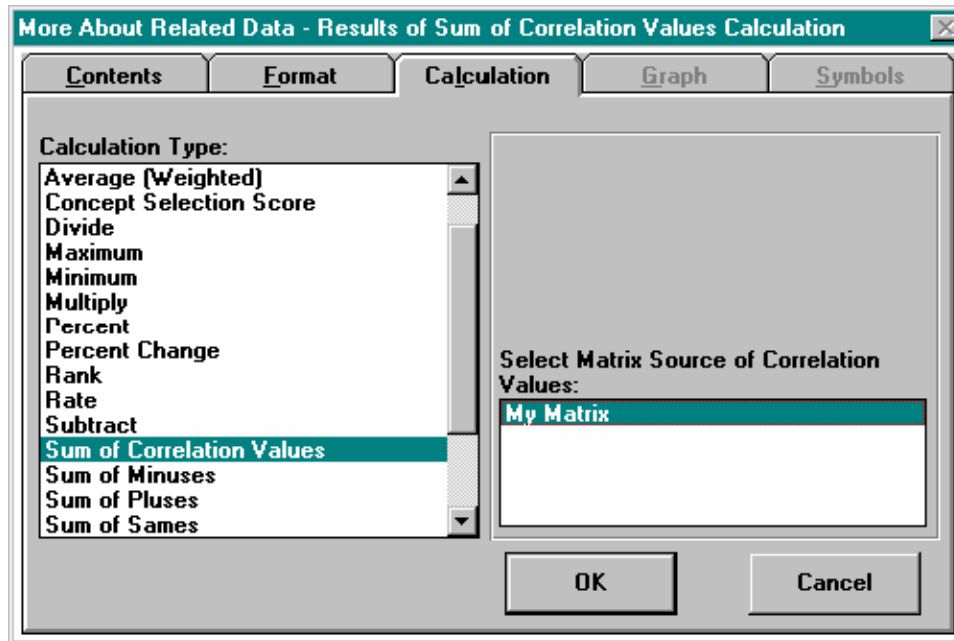
	0	1	2	3	4	5
0		Related Data 1	Related Data 2	Related Data 3	Related Data 4	Results of Subtract Calculation
1	List Entry 1	2.0	4.0	3.0	4.0	-1.0
2	List Entry 2	1.0	1.0	4.0	3.0	-3.0
3	List Entry 3	3.0	2.0	1.0	4.0	2.0
4	List Entry 4	2.0	3.0	3.0	1.0	-1.0
5						

The resultant values shown in column 5 were obtained by subtracting the values contained in column 3 from the values contained in column 1 for each List Entry.

## Sum of Correlation Values

Sum of Correlation Values computes the sum of the relationships in a matrix associated with a List Entry.

The results of this calculation can be used to check the balance of a matrix. If all results of this calculation fall within a certain range, then each List Entry has approximately the same magnitude of relationships. Any results that fall out of this range should be reviewed to make sure that adequate relationships have been defined.



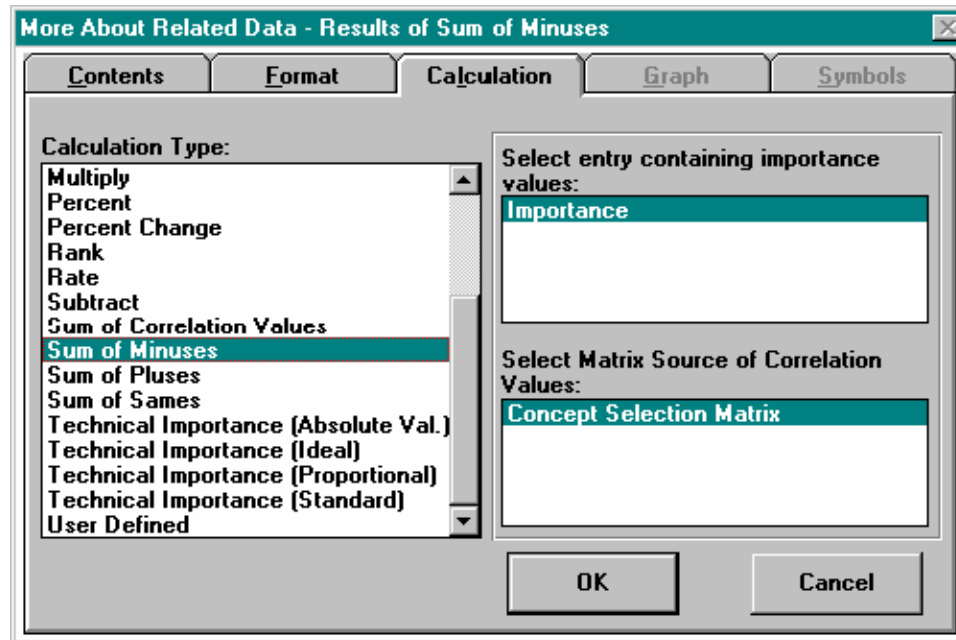
The following Chart illustrates the Sum of Correlation Values calculation.

	<i>Output Entry 1</i>	<i>Output Entry 2</i>	<i>Output Entry 3</i>	<i>Output Entry 4</i>	<i>Results of Sum of Correlation Values Calculation</i>
<i>List Entry 1</i>	9	0	3	0	12.0
<i>List Entry 2</i>	0	9	0	0	9.0
<i>List Entry 3</i>	0	1	9	0	10.0
<i>List Entry 4</i>	0	0	0	1	1.0

The resultant values shown were obtained by adding the relationship values across each row.

## Sum of Minuses

Sum of Minuses computes the weighted sum of Minuses in a concept selection Matrix.



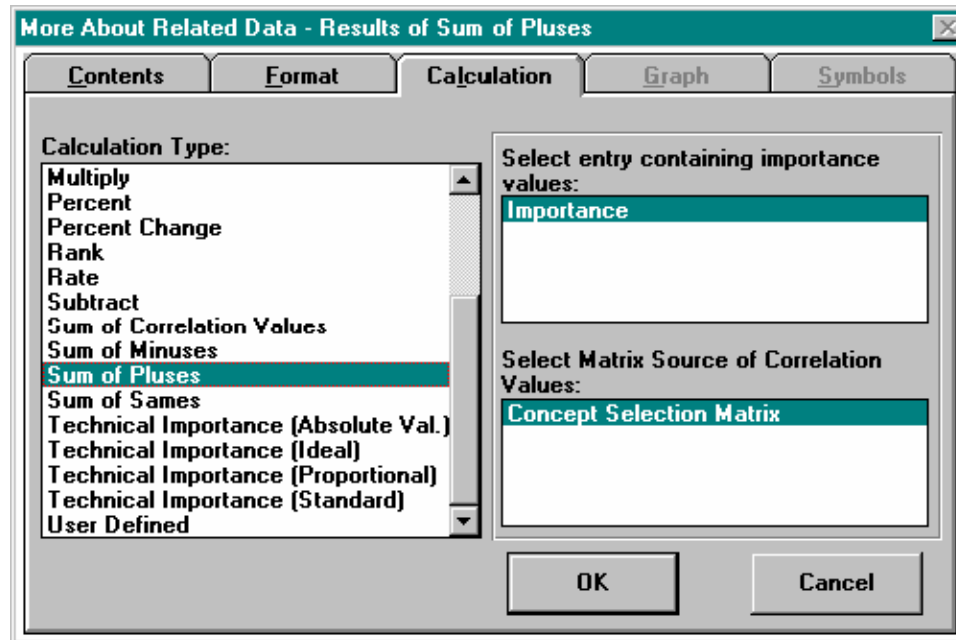
The following List illustrates the Sum of Minuses calculation.

	Baseline Concept	Concept1	Concept2	Concept3	Importance
Input List Entry 1		+	+	-	2.0
Input List Entry 2		*	+	*	4.0
Input List Entry 3		-	*	-	1.0
Results of Sum of Minuses		2.0	6.0	0.0	
Results of Sum of Maxes		1.0	0.0	3.0	
Results of Sum of Same		4.0	1.0	4.0	
Results of Concept Selection Score		1.0	6.0	-3.0	

For this example, the Sum of Minuses for Concept 3 is equal to 3.0 which was obtained by performing the following mathematical calculation:  
 $[(2.0) * 1.0] + [(1.0) * (1.0)]$

## Sum of Pluses

Sum of Pluses computes the weighted sum of Pluses in a concept selection Matrix.



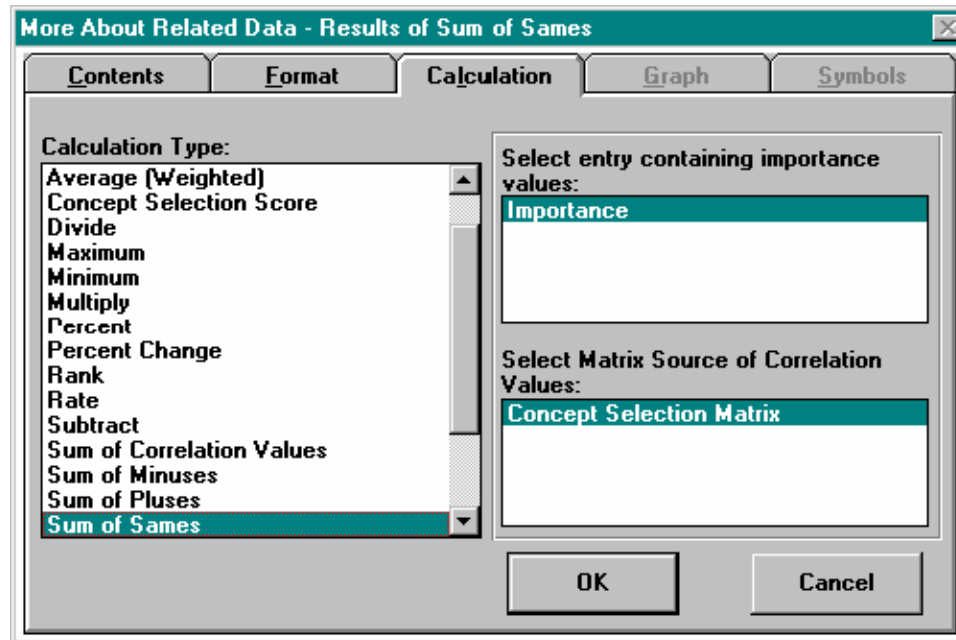
The following List illustrates the Sum of Pluses calculation.

	Baseline Concept	Concept1	Concept2	Concept3	Importance
<b>Concept Selection</b>					
Better	■	1			
Same	★	0			
Worse	■	-1			
Input List Entry 1		+	+	-	2.0
Input List Entry 2		★	+	★	4.0
Input List Entry 3		-	★	-	1.0
Results of Sum of Pluses		2.0	6.0	0.0	
Results of Sum of Minuses		1.0	0.0	3.0	
Results of Sum of Same		4.0	1.0	4.0	
Results of Concept Selection Score		1.0	6.0	-3.0	

For this example, the Sum of Pluses for Concept 2 is equal to 6.0 which was obtained by performing the following mathematical calculation:  
 $[(2.0) * 1.0] + [(4.0) * 1.0]$

## Sum of Sames

Sum of Sames computes the weighted sum of Sames in a concept selection Matrix.



The following List illustrates the Sum of Sames calculation.

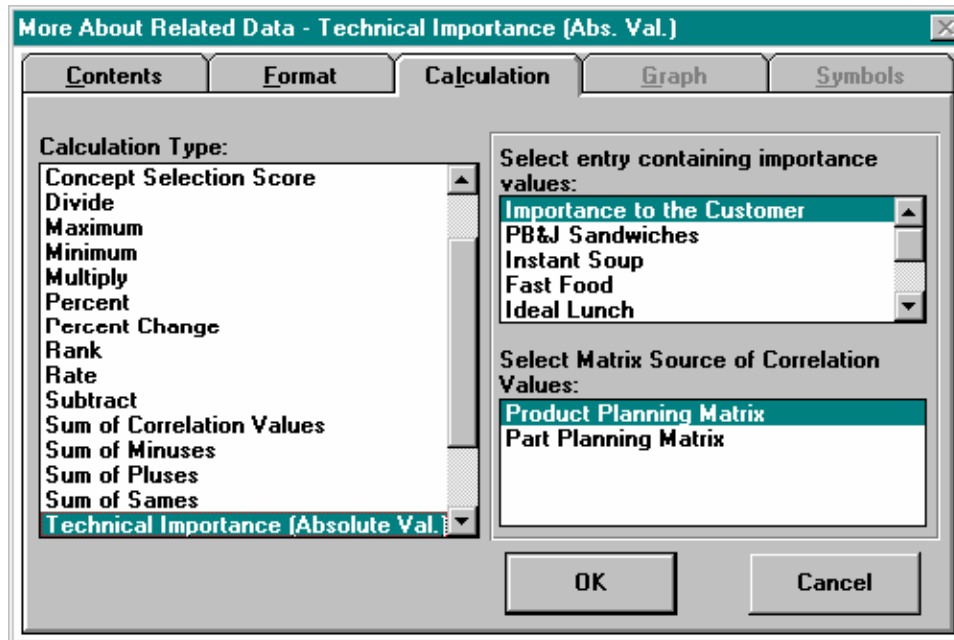
	Baseline Concept	Concept1	Concept2	Concept3	Importance
Input List Entry 1		+	+	-	2.0
Input List Entry 2		*	+	*	4.0
Input List Entry 3		-	*	-	1.0
Results of Sum of Pluses		2.0	6.0	0.0	
Results of Sum of Minuses		1.0	0.0	3.0	
Results of Sum of Sames		4.0	1.0	4.0	
Results of Concept Selection Score		1.0	6.0	-3.0	

For this example, the Sum of Sames for Concept 3 is equal to 4.0 which was obtained by performing the following mathematical calculation:  $4.0 * 1.0$

## Technical Importance (Absolute Value)

Technical Importance (Absolute Value) computes the weighted sum of the relationships in a matrix on a List Entry by List Entry basis. Negative relationships are treated as if they were positive relationships. The user specifies which data should be used to weight the relationships. The weighting data is usually found in an Importance column related to the input list of the matrix.

Select the desired Related Data Entry from the Select entry containing importance values list box. Then select the desired Matrix from the Select Matrix source of correlation values list box.



The following Matrix illustrates the Technical Importance (Absolute Value) calculation.

	Weight of Portion	Percent Nutrition Provided	Percent Carbohydrate Provided	Time to Prepare	Number of Dishes Used	Cost of Ingredients	Number of Measured Ingredients	Importance to the Customer
Fills us up	● 9	▽ 1	○ 0					5.0
Is nutritious	▽ 1	● 9	▽ 1			○ 0		4.0
Tastes good			● 9			○ 0		3.0
Is easy to make				● 9	○ 0		● 9	4.0
Is easy to clean up			○ 0	● 9	● 9		▽ 1	2.0
Sticks with us	● 9		○ 0					4.0
Is inexpensive	▽ 1					● 9		1.0
Is clean			○ 0	○ 0			● 9	2.0
Technical Importance (Standard)	86.0	41.0	68.0	48.0	36.0	30.0	66.0	
Technical Importance (Abs. Val.)	86.0	41.0	68.0	48.0	36.0	30.0	66.0	
Technical Importance (Ideal)	9.6	4.6	6.4	5.3	4.0	3.3	6.2	
Technical Importance (Proportional)	6.8	3.0	4.7	2.8	2.4	2.5	3.1	

Standard 9-0-1

Strong ● 9  
 Moderate ○ 0  
 Weak ▽ 1

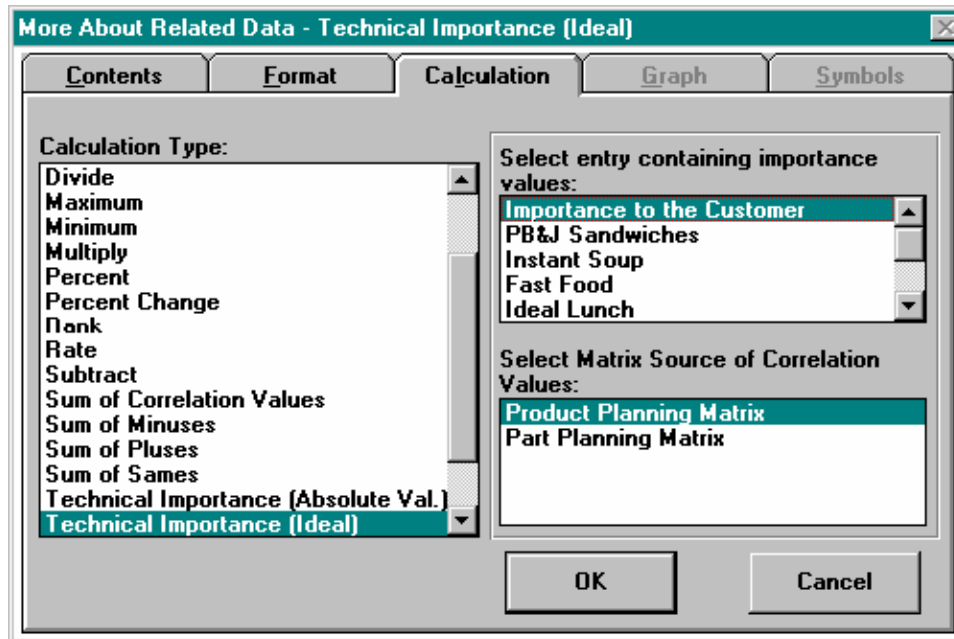
The resultant values shown in the “Technical Importance (Absolute Value)” row were obtained by performing an absolute value of the sum-product of each Relationship Value and the “Importance to the Customer”. For example, the first value - 86.0 - was obtained as follows:

	Relationship Value	Importance Value	Product
Fills us up	9.0	5.0	45.0
Is nutritious	1.0	4.0	4.0
Sticks with us	9.0	4.0	36.0
Is inexpensive	1.0	1.0	1.0
Is clean	0.0	2.0	0.0
Technical Importance			86.0

## Technical Importance (Ideal)

Technical Importance (Ideal) computes the weighted sum of the relationships in a matrix on a List Entry by List Entry basis. All relationships are divided by the maximum relationship value of the scale. For example, the maximum relationship value for the standard 9-3-1 scale would be 9. The user specifies which data should be used to weight the relationships. The weighting data is usually found in an Importance column related to the input list of the matrix.

Select the desired Related Data Entry from the Select entry containing importance values list box. Then select the desired Matrix from the Select Matrix source of correlation values list box.



The following Matrix illustrates the Technical Importance (Ideal) calculation.

	Weight of Portion	Percent Nutrition Provided	Percent Carbohydrate Provided	Time to Prepare	Number of Dishes Used	Cost of Ingredients	Number of Measured Ingredients	Importance to the Customer
Fills us up	●	▽	○					5.0
Is nutritious	▽	●	▽			○		4.0
Tastes good			●			○		3.0
Is easy to make				●	○		●	4.0
Is easy to clean up				○	●		▽	2.0
Sticks with us	●		○					4.0
Is inexpensive	▽					●		1.0
Is clean				○	○		●	2.0
Technical Importance (Standard)	86.0	41.0	58.0	48.0	36.0	30.0	56.0	
Technical Importance (Abs. Val.)	86.0	41.0	58.0	48.0	36.0	30.0	56.0	
Technical Importance (Ideal)	9.6	4.6	6.4	5.3	4.0	3.3	6.2	
Technical Importance (Proportional)	6.8	3.0	4.7	2.8	2.4	2.5	3.1	

Standard 9-3-1

Strong ● 9  
 Moderate ○ 3  
 Weak ▽ 1

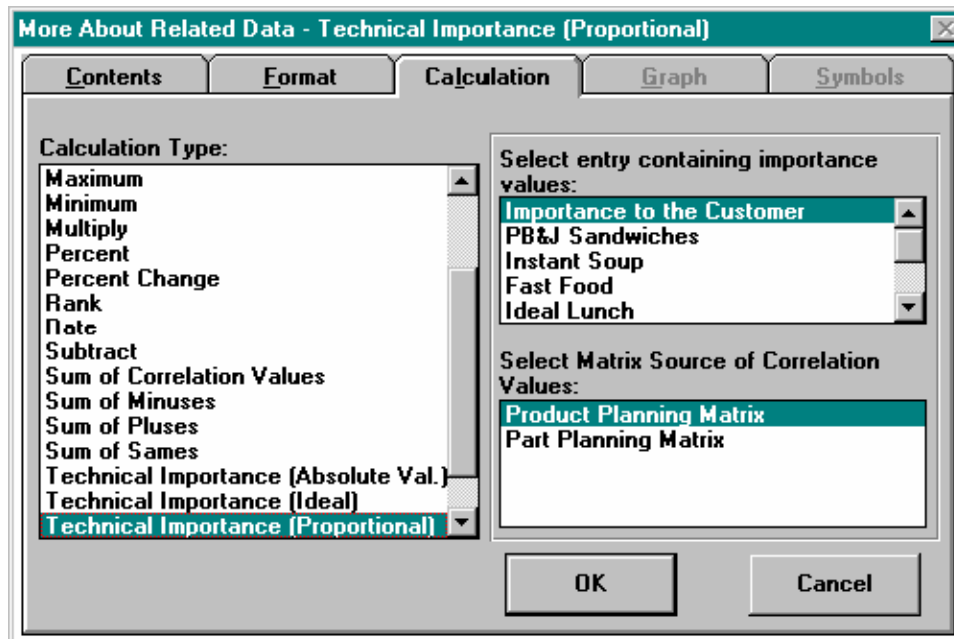
The resultant values shown in the “Technical Importance (Ideal)” row were obtained by dividing the sum product of each Relationship Value and the “Importance to the Customer” by the maximum scale value. For example, the first value, 9.6, was obtained as follows:

	Relationship Value	Importance Value	Product
Fills us up	9.0/9.0	5.0	5.00
Is nutritious	1.0/9.0	4.0	0.44
Sticks with us	9.0/9.0	4.0	4.00
Is inexpensive	1.0/9.0	1.0	0.11
Is clean	0.0/9.0	2.0	0.00
Technical Importance			9.6

## Technical Importance (Proportional or Normalized)

Technical Importance (Proportional) computes the weighted sum of the relationships in a matrix on a List Entry by List Entry basis. All relationships are divided by the sum of the relationship values in the row for which the relationship appears. The user specifies which data should be used to weight the relationships. The weighting data is usually found in an Importance column related to the input list of the matrix.

Select the desired Related Data Entry from the Select entry containing importance values list box. Then select the desired Matrix from the Select Matrix source of correlation values list box.



The following Matrix illustrates the Technical Importance (Proportional) calculation.

	Weight of Portion	Percent Nutrition Provided	Percent Carbohydrate Provided	Time to Prepare	Number of Dishes Used	Cost of Ingredients	Number of Measured Ingredients	Importance to the Customer
Fills us up	●	▽	○					5.0
Is nutritious	▽	●	▽			○		4.0
Tastes good			●			○		3.0
Is easy to make				●	○		●	4.0
Is easy to clean up			○	●			▽	2.0
Sticks with us	●		○					4.0
Is inexpensive	▽					●		1.0
Is clean			○	○			●	2.0
Technical Importance (Standard)	88.0	41.0	68.0	48.0	36.0	30.0	66.0	
Technical Importance (Abs. Val.)	88.0	41.0	68.0	48.0	36.0	30.0	66.0	
Technical Importance (Ideal)	9.6	4.6	6.4	5.3	4.0	3.3	6.2	
Technical Importance (Proportional)	6.8	3.0	4.7	2.8	2.4	2.5	3.1	

Standard 9-0-1

Strong ● 9

Moderate ○ 0

Weak ▽ 1

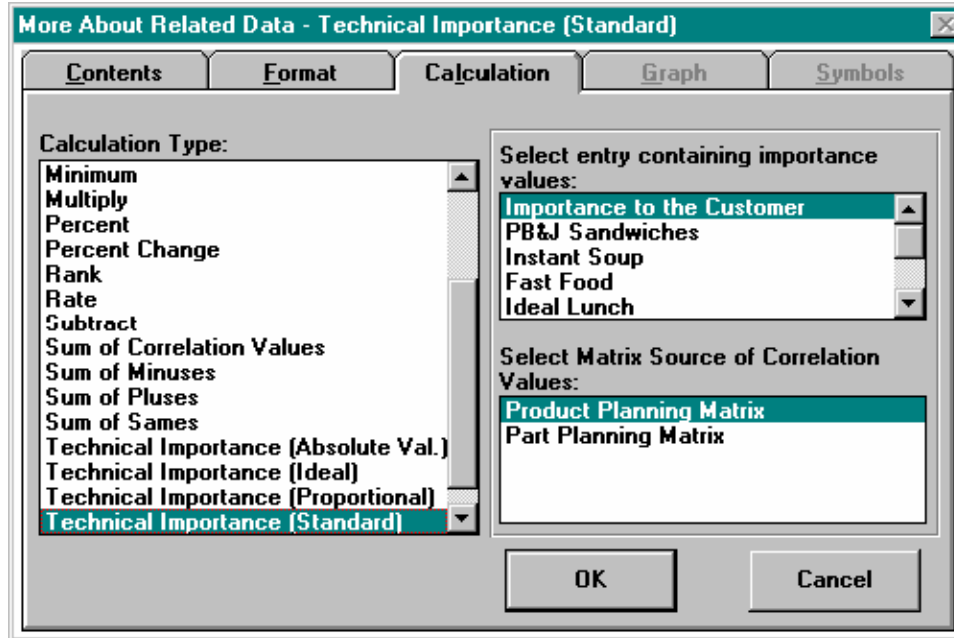
The resultant values shown in the “Technical Importance (Proportional)” row were obtained by dividing the sum-product of each Relationship Value and the “Importance to the Customer” by the sum of the relationship values in each row. For example, the first value, 6.8, was obtained as follows:

	Relationship Value	Importance Value	Product
Fills us up	9.0/13.0	5.0	3.45
Is nutritious	1.0/14.0	4.0	0.29
Sticks with us	9.0/12.0	4.0	3.00
Is inexpensive	1.0/10.0	1.0	0.10
Is clean	0.0/15.0	2.0	0.00
Technical Importance			6.8

## Technical Importance (Standard)

Technical Importance (Standard) computes the weighted sum of the relationships in a matrix on a List Entry by List Entry basis. The user specifies which data should be used to weight the relationships. The weighting data is usually found in an Importance column related to the input list of the matrix.

Select the desired Related Data Entry from the Select entry containing importance values list box. Then select the desired Matrix from the Select Matrix source of correlation values list box.



The following Matrix illustrates the Technical Importance (Standard) calculation.

	Weight of Portion	Percent Nutrition Provided	Percent Carbohydrate Provided	Time to Prepare	Number of Dishes Used	Cost of Ingredients	Number of Measured Ingredients	Importance to the Customer
Fills us up	●	▽	○					5.0
Is nutritious	▽	●	▽			○		4.0
Tasks good			●			○		3.0
Is easy to make				●	○		●	4.0
Is easy to clean up				○	●		▽	2.0
Sticks with us	●		○					4.0
Is inexpensive	▽					●		1.0
Is clean				○	○		●	2.0
Technical Importance (Standard)	86.0	86.0	41.0	58.0	48.0	36.0	30.0	56.0
Technical Importance (Abs. Val.)	86.0	41.0	58.0	48.0	36.0	30.0	56.0	56.0
Technical Importance (Ideal)	9.6	4.6	6.4	5.3	4.0	3.3	6.2	6.2
Technical Importance (Proportional)	6.8	3.0	4.7	2.8	2.4	2.5	3.1	3.1

Standard 9-3-1	
Strong	● 9
Moderate	○ 3
Weak	▽ 1

The resultant values shown in the “Technical Importance (Standard)” row were obtained by performing a sum-product of each Relationship Value and the “Importance to the Customer”. For example, the first value, 86.0, was obtained as follows:

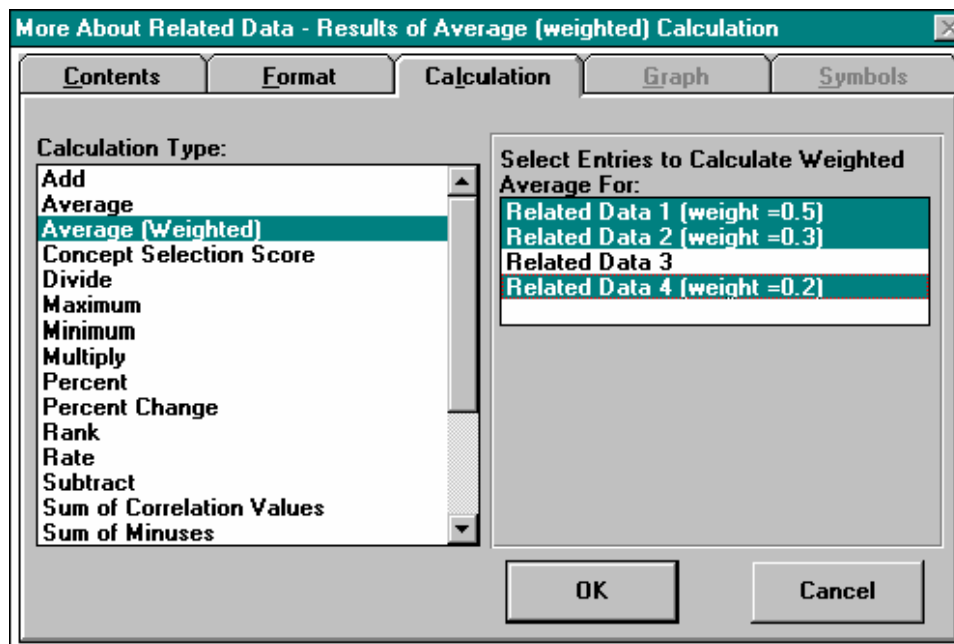
	Relationship Value	Importance Value	Product
Fills us up	9.0	5.0	45.0
Is nutritious	1.0	4.0	4.0
Sticks with us	9.0	4.0	36.0
Is inexpensive	1.0	1.0	1.0
Is clean	0.0	2.0	0.0
Technical Importance			86.0

## Weighted Average

Average (Weighted) multiplies the selected Related Data Values by the Related Data Entry's Weighting Factor; and computes the sum of those resultant values. The weighting factor is defined in the Contents tab of the More About Related Data dialog box.

Select the desired Related Data Entries from the Select Entries to Calculate Weighted Average for list box.

To select multiple Entries, use either the Shift or Ctrl keys on the keyboard, while clicking on the desired Entry. The Shift key provides a continuous selection; whereas, the Ctrl key provides non-continuous selections.



The following List illustrates the Average (Weighted) calculation.

	0	1	2	3	4	5
0		Related Data 1 [weight =0.5]	Related Data 2 [weight =0.3]	Related Data 3	Related Data 4 [weight =0.2]	Results of Average [weighted] Calculation
1	List Entry 1	2.0	4.0	3.0	4.0	3.0
2	List Entry 2	1.0	1.0	4.0	3.0	1.4
3	List Entry 3	3.0	2.0	1.0	2.0	2.5
4	List Entry 4	4.0	3.0	3.0	1.0	3.1
5						

The resultant values shown in column 5 equal the weighted average (mean) of the values contained in columns 1, 2, and 4 for each List Entry. For this example, the weighted average of List Entry 1 is equal to 3.0 which was obtained by performing the following mathematical calculation:  $[(0.5)*2.0] + [(0.3)*4.0] + [(0.2)*4.0]$

## User Defined Calculations

User Defined calculations allow you to write a simple arithmetic formula to derive the data shown in a row or column.

For example, you could add the data from two Related Data rows and subtract the data from a third row using the following formula:

$$\text{DATA}(1) + \text{DATA}(2) - \text{DATA}(3)$$

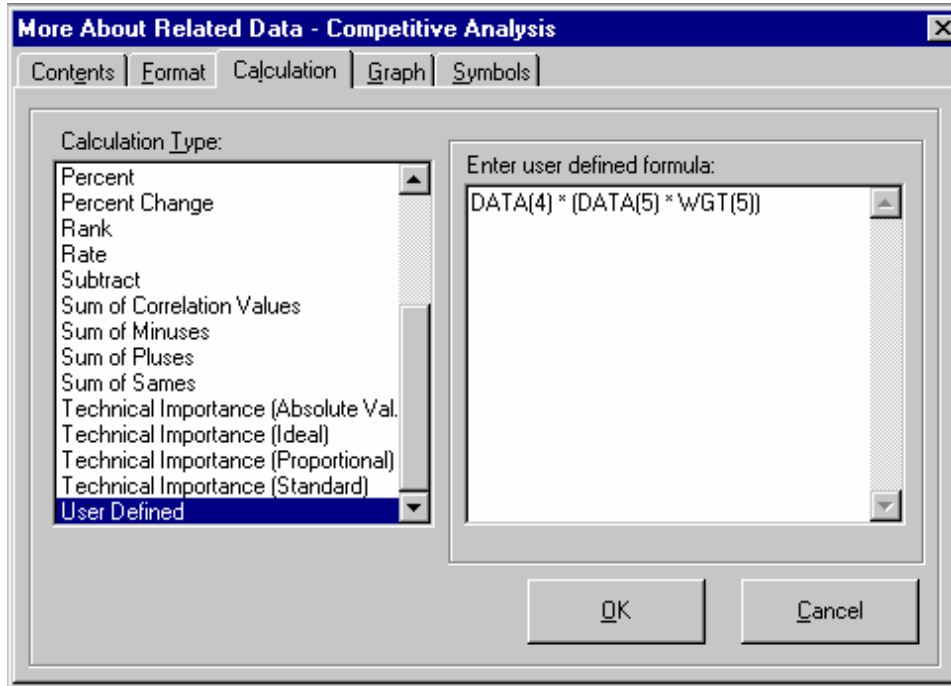
The operations supported by User Defined calculations are addition (+), subtraction (-), multiplication (\*), and division (/).

The DATA() macro accesses the data values within a Related Data Entry by its column number in the List window.

The WGT() macro accesses the Weighting Factor value of a particular Related Data Entry by its column number in the List window. (Weighting Factor is set in the lower left corner of the More About Related Data dialog box.)

To setup the calculation:

- Click on User Defined in the Calculation Type list.
- Type in the desired formula in the Enter user defined formula area.



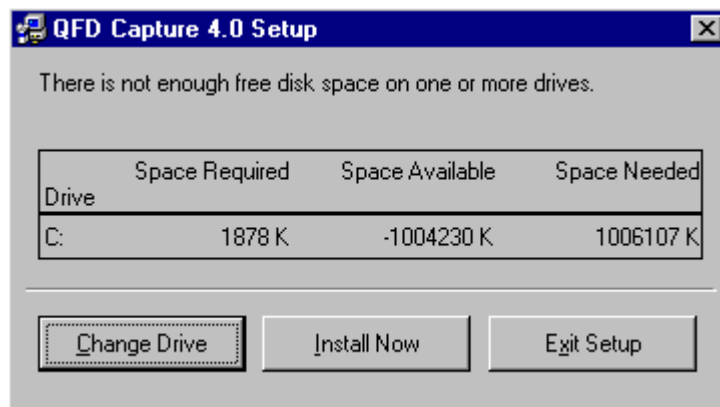
## Chapter 11: TroubleShooting

This section describes the possible causes and workarounds for error messages that you may see when running Capture software.

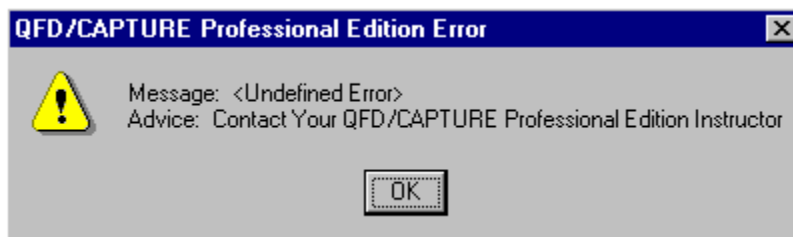
### "Not enough free disk space" message during installation

During the installation process, your system will be checked to see if there is adequate disk space to install all of the necessary files. If a message comes up saying "There is not enough free disk space on one or more drives", then you should free up at least 100 MB of disk space. (Capture installation files take up about 12 MB of space. However, Windows need a certain amount of free disk space to operate. Actually, freeing up at least 500 MB of free space is highly desired.)

There is an inconsistency in some versions of the installation program that will show a very large negative number under "Space Available" in the error window. If you see this (see sample below), then you can still go ahead and install the Capture software by clicking on the "Install Now" button.



## "Undefined Error" message



If you see an error message saying "Undefined Error" when running Capture, it could have one of the following causes:

**Cause:** Your system has run low on free disk space.

**Solution:** You should try to free up at least 100MB of disk space on your primary drive (where Windows resides) - usually the C: drive.

**Cause:** One or more shared files that Capture software uses were not found or were not registered properly with Windows.

**Solution:** Uninstall the Capture software and install it again. To uninstall, select Start-Settings-Control Panel from the Windows menu. Then run the "Add/Remove Programs" control panel. Locate QFDcapture or DECISIONcapture in the list of programs and click on it. Then click on the "Add/Remove" button to continue with the uninstall. Once this is complete, then run the setup.exe installation program found on your Capture CDROM. (Make sure that no other programs are running during the installation.)

If the error still appears when you run the Capture software, then one or more of the shared files probably has not registered correctly with Windows. You should attempt to "manually" register the files using the Windows "regsvr32.exe" program.

## **"Error loading from file" message**

**Cause:** One or more shared files that the Capture software uses were not found or were not registered properly with Windows.

**Solution:** Uninstall the Capture software and install it again. To uninstall, select Start-Settings-Control Panel from the Windows menu. Then run the "Add/Remove Programs" control panel. Locate QFDcapture or DECISIONcapture in the list of programs and click on it. Then click on the "Add/Remove" button to continue with the uninstall. Once this is complete, then run the setup.exe installation program found on your Capture CDROM.

If the error still appears when you run the Capture software, then one or more of the shared files probably has not registered correctly with Windows. You should attempt to "manually" register the files using the Windows "regsvr32.exe" program.

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## Chapter 12: The Basics of QFD

### What is QFD?

Quality Function Deployment (QFD) is a systematic process for getting a business to focus on its customers. It is used by cross-functional teams to identify and resolve issues involved in providing products, processes, services and strategies which will more than satisfy their customers.

A prerequisite to QFD is Market Research. This is the process of understanding what the customer wants, how important these benefits are, and how well different providers of products that address these benefits are perceived to perform. This is a prerequisite to QFD because it is impossible to consistently provide products which will attract customers unless you have a very good understanding of what they want.

### Why use QFD?

Once a team has identified the customers' wants, QFD is used for two fundamental reasons:

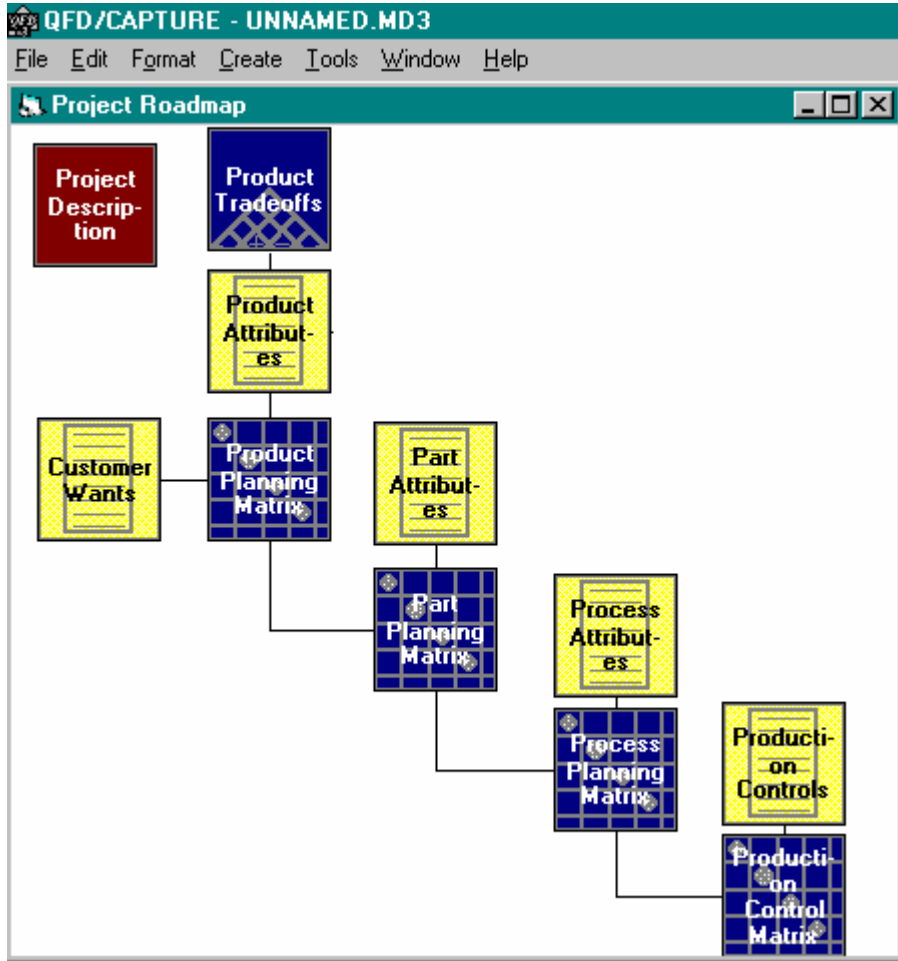
- To improve the communication of customer wants throughout the organization
- To improve the completeness of specifications and to make them traceable directly to customer wants and needs

QFD requires that representatives of the different organizations involved in producing the product be involved in its definition. Consequently, these representatives discuss the meaning of the customer wants and work together to ensure that they come to a common understanding. Communications throughout the organization is greatly improved. This process will also uncover many issues whose resolution will lead to a more complete specification.

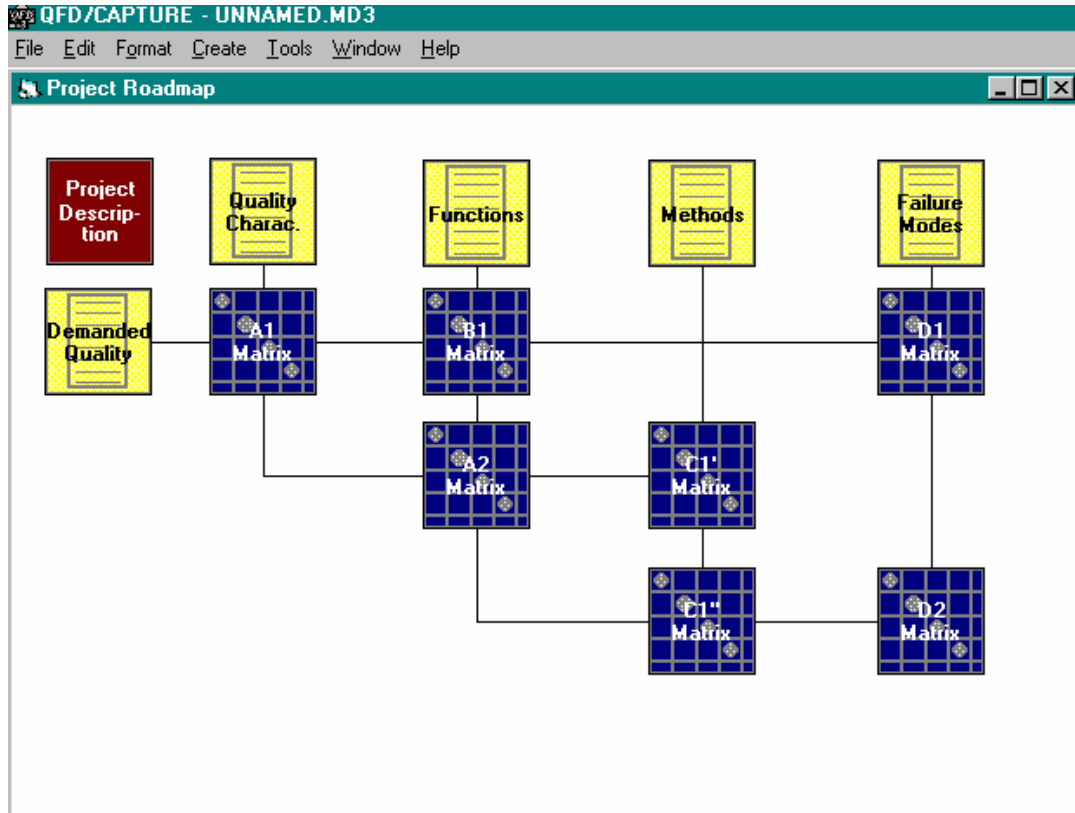
## What are some approaches to QFD?

There are many different approaches to QFD:

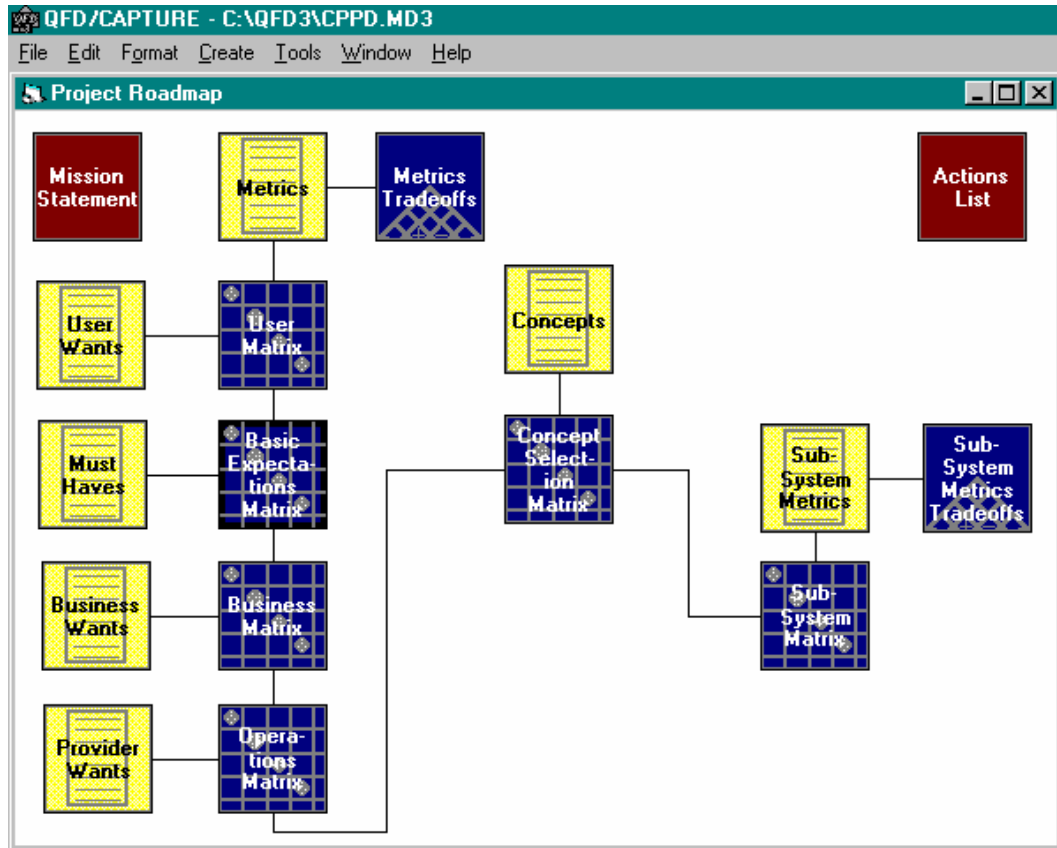
The Four-Phase approach uses a QFD Matrix to translate Customer Wants into Product Characteristics. The Product Characteristics are then translated through another QFD Matrix into Part Characteristics. Part Characteristics are translated into Process Characteristics. Finally, Process Characteristics are translated into Production Controls.



The Matrix of Matrices approach was developed by GOAL/QPC and is used to address a wide variety of development issues. It identifies specific matrices which should be used to address specific development issues. This approach is best described in a book titled "Better Designs in Half the Time" available from GOAL/QPC.



The International TechneGroup, Incorporated (ITI) QFD approach for Concurrent Product/Manufacturing Process Development was developed to support ITI's work in helping corporations to implement Concurrent Engineering practices. It involves evaluating the wants and needs from all different types of customers. It also integrates the principles of concept selection to help development teams to objectively evaluate alternatives.



There are many other approaches. In fact, the flavor of QFD is often what differentiates one consultant from another. However, almost everyone agrees that for QFD to be successfully implemented within an organization, it must be adapted to the particular situation surrounding its use.

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Capture software was designed to support all of these approaches and more. For more information, refer to “How to open a template file” in “Chapter 3: Roadmap How To’s”.

## **What are the basic tools of QFD?**

The basic tools of QFD are Project Roadmaps, Documents, Lists and Matrices. A Project Roadmap defines the flow of data through a QFD project. Documents record background information for a project. A Matrix is simply a format for showing the relationships between two or more Lists. Lists form the input rows and output columns of the Matrices. Example of Lists include: User Benefits, Measures, Basic Expectations, Functions, and Alternative Concepts.

Lists generally have other Related Data associated with them. For example, the priorities and perceived performance ratings resulting from Market Research would be associated with the List of Benefits. Importance values would also be associated with Measures and Functions.

Matrices are used to relate two or more Lists to each other, thus deploying or transferring the importance from the input lists to the output lists. For example, a common Matrix relates Measures to User Benefits. Another Matrix could be used to relate Measures to both User Benefits and Basic Expectations. Matrices are a flexible tool which can be configured to the particular needs of each project.

## Chapter 13: Capturing Market Data

### How do we define Customers?

There are many different ways to identify the Customers of a product or service. A commonly used approach is to ask the team "Who must be satisfied with the product in order for the product to be considered successful?" Typically, a team will identify the following customer groups:

- Users who are mainly concerned with functionality
- Management who is mainly concerned with financial and strategic issues
- Distribution and Purchasing Agents who are concerned with purchase transaction and availability issues
- Internal workers who are concerned with how the product will affect the quality of their work life.

Each of these customer groups will tend to have different and, at times, conflicting requirements. Therefore, it is recommended that each customer group be assigned a priority by the team. Then, if a compromise is required between the different customer groups' requirements, it can be agreed upon somewhat objectively.

Capture software supports the definition of different customer groups in the following ways:

- The team may capture its customer list and the rationale for selecting the different customer groups as a document. For more information, please refer to "Documenting the Project" in "Chapter 2: Getting Started Tutorial".
- The team may capture a different set of requirements for each

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customer group. For more information, please refer to "How do we capture our Customers' Requirements?" in "Chapter 13: Capturing Market Data".

- The team can define a separate Matrix for each customer group. It is recommended that each Matrix compare the complete set of Measures against the list of requirements which are unique to each customer group. For more information, please refer to "Chapter 15: Measuring the Design".

The different customer groups can be weighted relative to each other so that requirements from an important customer group are given more weight than requirements from a less important customer group. For more information, please refer to "Chapter 14: Prioritizing Requirements".

## **How do we capture our Customers' Requirements?**

A fundamental principle of QFD is to determine directly from the customer what they would like a particular product or service to do. There are many different approaches to achieve this goal. They include:

- One on one customer interviews
- Focus groups
- In-context customer visits

Interviews are useful because they allow you to effectively probe for detail. Focus groups are productive because they allow you to develop a lot of creative ideas by having the participants build upon one another's comments. In-context customer visits allow team members to actually observe how customers use existing products or perform existing functions and can lead to a dramatically improved understanding of what the customer really needs.

All of these approaches will yield the basis for a list of what the customer is seeking. This list can then be entered into the Capture software in the form of a Requirements List. For more information, please refer to "Chapter 4: List How To's".

## **How do we capture Importance to the Customers?**

QFD, as a process, yields the most effective results when the team focuses on the requirements which are most critical to the success of the product they are developing. Customers can help this process by telling the team which requirements are the most important to them when they are considering the purchase of a product in which several competing products exist.

Importance to the Customer is often gathered through “forced choice” surveys, which requires the person being surveyed to identify the relative importance of each of the requirements. There are many different methods which yield varied quality of results. Teams are encouraged to investigate Conjoint Analysis, The Analytical Hierarchy Process, and Forced Choice Prioritization methods. It is recommended that a reputable Market Research firm with experience in doing quantitative research for QFD be consulted.

Importance values are captured within the Capture software by defining a column of Related Data in the List Window. For more information, please refer to “Entering the WHATs Importance Values” in “Chapter 2: Getting Started Tutorial”.

## **How do we capture the Customers' Perceptions of Performance?**

A QFD team can learn a lot by asking customers, “How well do existing products satisfy these requirements?” Ideally, a customer would be familiar with multiple providers of competitive products. The team could then look at these Perceived Performance Ratings and try to determine why certain products were perceived to do well while other products were perceived to perform poorly. This information leads to an increased understanding of what would attract customers to the product currently being designed.

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Teams are encouraged to consult with a reputable Market Research firm which is familiar with the unique needs of the QFD process in order to gather this information.

Perceived Performance values are captured within the Capture software by defining a column of Related Data to contain the performance ratings for each product being examined. This is done within the appropriate List Window. For more information, please refer to “How to add a related data entry” in “Chapter 5: Related Data How To’s”.

### **How do we capture Customer Satisfaction Data?**

Customer Satisfaction Data is often used in place of Perceived Performance Data and is captured within the Capture software in the same way. For more information, please refer to "How do we capture the Customers' Perceptions of Performance?".

You should be aware of a common trap. If you are using existing customer satisfaction data, be sure that the requirements used to generate the Customer Satisfaction Data are good requirements from the QFD perspective and that the ratings indicate buying preference. Otherwise, the data may not produce useful results for the QFD project.

## Chapter 14: Prioritizing Requirements

### What should we use to prioritize Requirements?

Requirements are not always prioritized strictly based upon the importance which the Customers attach to each requirement. Often, the team wants to adjust the priorities of the requirements to account for the amount of work required to improve the customers' perceptions. Other teams will incorporate a factor to indicate where the company thinks the market is headed. Still other teams want to perform Gap Analysis and add additional importance to those requirements where there is a large gap between the importance that a customer attaches to a requirement and the level of satisfaction which most customers experience relative to that requirement.

All of these different methods of Prioritization involve defining calculations in the Related Data associated with a List of Requirements. For more information, please refer to "Chapter 5: Related Data How To's".

The following examples will illustrate these prioritization methods.

If the team wants to incorporate an indication of the amount of effort required to improve a product's performance in the eyes of the customer, they might set up Related Data columns as follows:

- Importance to the Customer
- Our Current Product
- Competitor One
- Competitor Two
- Our Future Product

- 
- Improvement Factor
  - Overall Importance
  - Percent Importance

The Importance to the Customer column would contain the importance ratings as given by the customers.

The data in the Our Current Product, Competitor One, and Competitor Two columns would contain Perceived Performance Ratings given by the customers which indicate how well they think the named products perform against the listed requirements.

The data in the Our Future Product column is set by the team to indicate their positioning strategy.

The change from Our Current Product to Our Future Product is an indication of the amount of work required to change the level of Perceived Performance and is generally calculated and stored as the Improvement Factor. Two approaches to this calculation are supported in QFDcapture.

- The traditional calculation is the ratio of Our Future Product ratings to the Our Current Product ratings. For more information, please refer to “Divide” in “Chapter 10: Calculation Reference”.
- Another calculation which is starting to be more widely used is a simple indication of how much of the rating scale must be climbed to go from Our Current Product ratings to Our Future Product ratings. For more information, please refer to “Percent Change” in “Chapter 10: Calculation Reference”.

The Overall Importance column contains the product of the Importance to the Customer and the Improvement Factor. For more information, please refer to “Multiply” in “Chapter 10: Calculation Reference”. Its values indicate where the team should focus attention in order to address what is important to the customer and where they have to do a lot of work.

The Percent Importance column simply contains the Overall Importance values translated into percentage values. For more information, please refer to “Percent” in “Chapter 10: Calculation Reference”.

If the team wanted to include its guess as to what would be more important in the future, it could incorporate an Importance Growth Factor into the Related Data described above.

The values in the Importance Growth Factor would be the percent change in the importance which is anticipated in the time frame of the project. For example, an Importance Growth Factor of 1.3 would indicate that the team expects the importance of that requirement to increase 30 percent in the time frame of the project. The Overall Importance column would now be set up to be the product of Importance to the Customer, Improvement Factor, and the Importance Growth Factor.

If the team wanted to use Gap Analysis as a means of prioritizing the requirements, they might set up the Related Data columns as follows:

- Importance to the Customer
- Level of Customer Satisfaction
- Gap Importance
- Percent Importance

The Importance to the Customer is the same as described above.

The Level of Customer Satisfaction column contains ratings from the customer which indicate how satisfied they are with the current approach to fulfilling the requirements.

The Gap Importance is a calculation of the form:

$$\begin{aligned} \text{Gap Importance} = & \\ & \text{Importance to the Customer} + \\ & (\text{Importance to the Customer} - \text{Level of Customer Satisfaction}) \end{aligned}$$

This calculation applies additional importance to those requirements where the customer is less satisfied than they ought to be. It is not a particularly rigorous calculation mathematically. However, it makes sense subjectively.

The Percent Importance is a conversion of the Gap Importance into percentages.

## **How should we define our Strategy?**

Product Positioning Strategy is generally defined after considering the importance of each requirement relative to the others on the list. It also accounts for the perceived performance ratings given by the customer. The strategy ratings are generally captured in a Related Data column called Future Product.

The rationale for setting strategy generally follows these guidelines:

- If the requirement is important and your product is perceived to perform worse than the other products on the market, set a stretch goal to get at least to the level of perceived performance experienced by the market leaders.
- If the requirement is important and your product is leading the marketplace in perceived performance, at least maintain that level of performance. Also, consider what could be done to "blow the top off the scale" as a way of clearly differentiating your product from any competition.
- If the requirement is not very important, consider maintaining or even reducing perceived performance in the product since the customers do not make their decisions with much consideration relative to this requirement.

### **How should we include our Sales Factors?**

When prioritizing the requirements, some teams want to include a factor to indicate that additional importance should be given to particular requirements. In a way, the importance of these requirements is underestimated by Customers because they do not understand the benefit which would be provided if the requirement were satisfied. The factor used to indicate this additional importance is known as the Sales Factor.

Sales Factors or Sales Points are defined in a column of Related Data associated with a list and act as multipliers in calculating the overall importance of each requirement. The traditional ratings are:

- 1.0 We will not be emphasizing this requirement in our Marketing efforts
- 1.2 We will mention this in our Marketing Literature
- 1.5 We will emphasize satisfaction of this requirement in our Marketing efforts.

It should be cautioned that there is tremendous potential for abusing this rating and it should therefore be used very carefully.

### **What does this information tell us?**

The information used to prioritize the Requirements is some of the most interesting and important information collected during the QFD process. The results of the QFD project start to become apparent once the team begins sorting the data to look at it from many different perspectives.

The following are just some of the issues which can be answered by closely examining the prioritization data:

#### **What does the customer think is most important?**

Answer this question by sorting the List of Requirements by the data in the Importance to the Customer column. For more information, please refer to “How to sort a list” in “Chapter 4: List How To’s”.

#### **What are our strengths and weaknesses in the Marketplace?**

Answer this question by defining two calculations in the Related Data. First of all, define a Related Data column called Maximum Perceived Performance Rating. Set it up to calculate the Maximum Rating for each requirement found in the Perceived Performance ratings columns. For more information, please refer to “Maximum” in “Chapter 10: Calculation Reference”.

Secondly, create a Related Data column called Performance Gap. Set this up to subtract the ratings of your product from the Maximum Perceived Performance Rating values. For more information, please refer to “Subtract” in “Chapter 10: Calculation Reference”. Sort the List based upon the values in this column in descending order. The Requirements where you are perceived to be weakest will be at the top of the list.

### **Where are we positioning ourselves?**

Answer this question by sorting the List of Requirements by the data in the Our Future Product column. The Requirements at the top of the list will be those where we want to achieve the best performance.

### **Where do we have to do the most work?**

Answer this question by sorting the List of Requirements by the data in the Improvement Factor column. The Requirements at the top of the list will be those for which the customer's perception needs to change the most.

### **Where should we focus our attention?**

Answer this question by sorting the List of Requirements by the data in the Percent Importance column. The Requirements at the top of the list will be those on which we should focus in order to provide what the customers most want and to implement our product strategy.

## Chapter 15: Measuring the Design

### Why define Design Measures?

Often, Customer Requirements are very subjective statements of the benefits which a Customer is seeking from a product. Though the team members may think they are in near total agreement about the meaning of a particular statement, the individuals on a team are often interpreting the statements in very different ways. This difference of interpretation often does not become evident until the team attempts to define ways to satisfy the Requirements.

The process of translating Customer Requirements into Design Measures is a way to force the team to define, using measurable and actionable statements, exactly what each Requirement means in the language of the organization. For example, let's say that a Customer Requirement for a software package is "Is easy to use". The programmers would be left to their own interpretation as to whether their software would really satisfy their Customers. On the other hand, through the QFD process, a team might define the following Measures for "Is easy to use":

- User rating of screen layout concepts
- Number of user operations required to perform the desired functions
- Number of different input devices required to perform the desired functions

These Measures reflect the team's interpretation of what makes software easy to use. They believe that the screens have to be well laid out. They also believe that Customers should not have to perform a lot of operations to get useful work accomplished and those operations should not require that Customers move their hands between input devices (i.e.: mouse and keyboard).

Unfortunately, there are no standards relative to what comprises a good Measure. Some guidelines that have proved useful include:

- Be Measurable on the Design - If it can only be measured after the product is on the market, it won't help the team design a better product.
- Be Controllable - If the team cannot adjust the value of a Measure through design decisions, they will not be able to improve the design.
- Be Implementation Independent - If a Measure is only applicable for a particular design approach, it may tend to force the team away from other, more satisfactory approaches.
- Have a Preferred Direction of Improvement - The team should be able to determine if the product will better satisfy the Customer if the Measure is increased or decreased.

There are also many different types of Measures. They include:

- Objective Measurements - These are unambiguous measurements like Length, Volume, Number of Steps, and Times.
- Indices - These are combinations of two or more Objective Measurements. For example, the Heat Index is an empirical rating which factors together temperature and humidity.
- Jury Evaluations - These are ratings by an unbiased group of representative customers concerning how well something works aesthetically. These deal mainly with subjective aesthetic issues such as taste or appearance.
- Percent of Desired List - These are used to document a subset of capabilities out of the entire "Desired List" that are to be included in the design.

The Capture software allows you to capture the Measures and the data related to the Measures within a List Window. For more information, please refer to “Developing the HOWs” in “Chapter 2: Getting Started Tutorial”.

## **How should we define our Design Measures?**

There are two main approaches to defining Measures. The most common approach is to brainstorm all of the possible Measures while reviewing the list of Requirements. This comprehensive list is then captured in a Capture List Window. Relationships between the Measures and the Requirements are then defined using a Spreadsheet view in the Matrix Window. For more information, please refer to “Chapter 16: Defining Relationships”.

Another approach, which is starting to be widely used, is to make use of a Tree analogy. A Requirement is treated as the trunk of a tree. The team then Brainstorms the Measures needed to address that particular Requirement. The Measures are recorded as Branches of the tree. For easier reading, the Tree is generally drawn sideways. The Capture software supports this method of definition via the Tree view in the Matrix Window. For more information, please refer to “How to add matrix relationships in the tree view” in “Chapter 6: Matrix How To's”.

QFDcapture also supports a Tree Diagram report which shows the measures for each requirement in a graphical tree and branch format. For more information, please refer to “How to create a tree diagram” in “Chapter 9: Advanced Features”.

## **What other information can we relate to Customer Requirements?**

It should be noted that Measures are only one type of information which can be related to Customer Requirements. Other types of information can also be recorded within Lists and be effectively related to Requirements. Some examples include:

- **Customer Characteristics** could be defined and related to Requirements to indicate which Customer Characteristic would tend to lead a Customer to have a particular Requirement. This could lead into Market Segmentation.
- **Design Alternatives** could be directly related to Customer Requirements in order to understand which Design Alternative would best satisfy the raw Customer Requirements. More commonly, Design Alternatives are directly related to Measures rather than to Customer Requirements.
- **Product Functions** could be defined and related to Customer Requirements in order to determine the Relative Value of a Function towards satisfying the Customer Requirements.
- **Product Parts or Assemblies** could be defined and related to Customer Requirements in order to determine the value of Parts relative to supplying Customer Satisfaction. If a Part provides less value, in the eyes of the Customer, than it costs to produce, then it is a good candidate for Cost Reduction efforts.
- **Product or Process Failure Modes** could be related to Customer Requirements in order to better understand which Failure Modes are most critical relative to meeting Customer Requirements.

In general, a Matrix can be thought of as the set of relationships between an Input List and an Output List. Customer Requirements are just one of many types of Input Lists. Any set of data for which the team would like to understand the relationship with Customer Requirements would be a valid Output List.

## Chapter 16: Defining Relationships

### Why define Relationships between Lists?

Relationships between Lists indicate how the two lists are related to each other. They are generally used to prioritize one List based upon the priorities of another list.

Relationships can be defined by answering a particular question for each cell in a Matrix. For example, the Relationships between Customer Requirements and Design Measures might be defined by asking "To what degree does this Measure predict the Customer's Satisfaction with this Requirement?" By asking this same question consistently for each Measure and Requirement combination, a set of Relationships will be defined in the Matrix which will help to determine which Measures are most important to control in order to achieve a desired level of Customer Satisfaction.

Another question which can be asked in order to define Relationships is "What percent of this Requirement is handled by this Design Measure?" The Relationships defined using this question would result in the highest priority being assigned to the Measures which control most of the functionality. These may not be the same as the Measures defined in order to predict Customer Satisfaction.

Given these examples, you can see that it is critical that a team understand what question they are trying to answer before they start defining Relationships. It is also critical that they use the same question consistently. By doing so, the team will be able to prioritize the Output List.

### How can Relationships be defined?

Relationships are defined within the Matrix Window of the Capture software. There are two different methods of defining the Relationships. The Spreadsheet View provides a familiar format for entering the relationship values. The Tree View provides a snapshot of the

Relationship values for each Input row, and makes it easier to assess each Relationship's value relative to the other Relationships.

The Spreadsheet View presents the Lists being related in a Spreadsheet format. The entries in the Input Lists form the row headings and the entries in the Output Lists form the column headings. The cells within the spreadsheet contain the relationships between the Input and Output entries.

The Tree View presents all of the Output List which are related to the currently selected Input List Entry using a Tree structure. This allows the team to consider the relative strength of the Relationships. It is equivalent to defining an entire row of relationships across a Matrix.

## **What scales should we use?**

The scales used to define the relationships can have a significant impact on the Prioritization of the Output List. The main consideration is the tradeoff between the number of levels in a scale, the speed of relationship definition, and the relative accuracy of the resulting Prioritization.

In general, the more levels in the scale, the more accurate the relative prioritization. The different values of the scale allow the team to indicate the levels of relationships that the Output List have with the Input List Entries. For example, the team may choose to use relationships with values of 1 through 10. Using this scale a value of 6 would indicate that one Output List Entry is twice as important to the satisfaction of an Input List Entry as an Output List Entry with a value of 3.

Relationship definition usually goes much faster if the team limits their choices of Relationship values to just a few. Standard QFD practice usually supports the values 1, 3, and 9. This Standard QFD Scale accentuates the Strong Relationships (value of 9). Output List with several Strong Relationships to Input List Entries will tend to be given a higher level of priority than Output List Entries related to many Input List Entries with either moderate or weak values. Other common scales include 1, 2, 3 and 1, 3, 5.

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With greater frequency, teams are defining relationships using advanced methods such as the Analytic Hierarchy Process to establish scales with an infinite number of levels. The resulting relationship values usually represent the percent contribution of each Output List to the selected Input List Entry.

The Capture software supports all of these different scales. Each time a new matrix is created, the user is given the opportunity to specify which of the standard scales will be used for the relationships. You may define your own unique scales as well. For more information, please refer to “How to select a set of relationship symbols for a matrix” in “Chapter 6: Matrix How To's” for a description of the available standard scales. The software will also allow the team to define relationship values as real numbers that represent percentages.

## Chapter 17: Identifying Tradeoffs

### Why evaluate Tradeoffs?

The tradeoffs, located in the "Roof" of the House of Quality, indicate the synergistic or detrimental impacts of changes in the Design Measures. They are used to identify critical compromises in the design. Since these compromises are likely to be encountered sooner or later, they may as well be examined as part of the QFD effort so that any required design changes are as inexpensive as possible.

### How should we evaluate Tradeoffs?

As with other matrices, the team should agree upon the question that they will ask in order to define the Relationships of this Matrix. A common question used is "If we improve our performance against this Measure, what is the impact on this other Measure? The team will determine if improving performance of one Measure helps or hurts the product's performance against another Measure. Generally, positive and negative values are used to indicate the positive or negative impact. The Tradeoffs Scale provided by the Capture software can be used as a scale for Relationships defined within this Matrix.

The Capture software allows a team to capture the tradeoffs it identifies. A matrix is created to capture the tradeoff information. For more information, please refer to "Defining Tradeoffs" in "Chapter 2: Getting Started Tutorial" One list forms both the input and the output of the matrix.

### How should we document Actions?

If a tradeoff is identified, there is usually some Action which is required in order to reduce the impact or work around the potential compromise. These Actions can be documented in several ways.

One approach is to create a document within the Capture software and

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record each action as a paragraph within the document. For more information, please refer to “Documenting the Project” in “Chapter 2: Getting Started Tutorial”.

Another approach would be to define a List of Actions. This would give the team the opportunity to relate Actions with the Customer Requirements, Design Measures, or any other List defined in the project. This approach would support prioritization of the Actions based upon their affect on the satisfaction of the related Input List. For more information, please refer to “Chapter 21: Defining Actions”.

## Chapter 18: Benchmarking

### Why Benchmark?

One of the prime reasons for using QFD is to develop a product or service which will excite the customer and get him/her to purchase your product. When a team captures the customer's perceptions of how well different products perform in the marketplace, the team can better understand what is driving the purchase decision. They are able to determine what the market likes and dislikes. However, they are really still dealing with Customer Perceptions and not actual performance. They have not necessarily learned what they, as a team, have to do to create the desired level of Perceived Performance.

Benchmarking your own, and others', products against the Design Measures which the team has established helps to define the level of Real Performance required to produce the desired level of Perceived Performance. It also helps you to answer the following questions:

- Has the team defined the right Measures to predict Customer Satisfaction?
- Does the product have perception, as opposed to , technical problems?

Benchmarking is a relatively expensive and time consuming process in most industries. Therefore, it is recommended practice to Benchmark only against the critical Design Measures. Criticality is defined by how important a particular Measure is to the success of the product and whether there are special circumstances impacting a particular Measure. A special circumstance might include whether a particular Measure is new or complex. Typically, a team might only Benchmark 50 percent of the Design Measures. Sorting the List of Design Measures based upon their importance values is a good way to identify which Measures to Benchmark.

## **Who should we Benchmark?**

Generally, teams Benchmark the same products or services for which they captured performance perceptions. In this way, they can try to correlate Actual Performance with the Perceived Performance.

A good policy is to Benchmark products across the whole spectrum of performance. In this way, it becomes much clearer what level of performance is perceived to be inadequate, what level is acceptable, and what level of performance currently gets customers excited about a product. Benchmarking all of the competitive products is not required; just check representative products.

## **How do we capture the results of Benchmarking?**

There are two schools of thought relative to capturing Benchmark Results. The first suggests that the team capture the raw Benchmark data directly and associate that data with the appropriate Measure. The other suggests that the team translate the raw Benchmark data into the same scale as was used to capture the perceived performance ratings.

Capturing the raw data and using it directly through the process tends to make it easier to understand exactly how well a product has to perform in order to achieve a desired level of customer satisfaction. However, the raw data sometimes implies too much precision for the process. For example, if the team were Benchmarking "Number of Commands Required to Perform the Desired Functions" as a way of predicting whether a software package would be perceived to be "Is easy to use", they could easily get caught up in counting precise numbers when, in reality, "Less than 10", "10 to 20", and "More than 20" might be sufficiently accurate for the purposes of the team.

On the other hand, translating the raw Benchmark data into the same rating scale as was used to capture perceived performances forces the team to repeatedly translate those ratings back into their original values. This tends to make nuances in the data disappear and be lost from consideration. However, since only numeric rating data is captured with this approach, the Capture software could graph this data. For more information, please refer to “How to setup a graph” in “Chapter 5: Related Data How To’s”.

The Capture software supports both of these approaches. The general process is to define Related Data columns for the list whose entries are to be Benchmarked. Each column would represent a particular product. If the raw data is to be captured, the team would configure the Related Data columns to contain text so that they could enter any type of data and units which are appropriate. If they instead want to capture the ratings, they would configure the columns to contain numbers only.

## Chapter 19: Setting Target Values

### How should we set our Target Values?

The final goal of many QFD projects is to set the Target Values for the Design Measures. This step occurs when the data gathered throughout the process is brought together and final decisions are made to answer the question "What are we really going to do (with respect to this product or service)?"

Setting Target Values should be relatively easy because:

- The team has already defined where they want their product to be positioned for the Customer. For more information, please refer to "How should we define our Strategy?".
- The team has Benchmarked the existing products to gain a good understanding of what level of actual performance is required in order to produce the desired level of perceived performance.
- The team has evaluated the Tradeoffs between Design Measures in order to determine what compromises may be required and how those compromises would be made.

Taking into account all of this information, the team decides upon the Targets which they will shoot for. Normally at this point, the team would not decide how they are going to achieve the Target Values. They are just stating, "we know that we have to achieve this level of performance if we are going to be perceived the way in which we want to be perceived." Deciding on the implementation approach will generally occur during the Conceptualization process. For more information, please refer to "Chapter 20: Design Concepts".

The Capture software supports setting Targets for a List through the Related Data columns associated with that List. Generally, a separate column is defined for each release which is being planned. For example, if a new product were going to be released in 1996 and followed up with enhancements in 1997 and 1998, the team would create a separate Related Data column for each year. This would allow the team to show the progression of product performance over the life of the Product. This implies a long term planning perspective rather than just a short term, get-it-out-the-door, perspective. Since Target data is generally textual, these columns would be configured to display Text (as opposed to just numeric).

## Chapter 20: Design Concepts

### Why evaluate Alternative Concepts?

When a team is assigned to develop a product or service, there is a strong inclination to quickly lock onto a particular approach and not seriously consider any others. These approaches, or Design Concepts, define the ways the team could implement the product or service. As the team develops the detailed design of the product, much of the time is spent modifying and refining the concept.

Not all concepts are equally good. Some concepts are extremely sensitive to the environment in which they have to operate and will only demonstrate the ability to perform as required when very specific conditions prevail. Other concepts exhibit a robustness that allows them to operate under a wide variety of conditions. A team should seek robust concepts as a way of ensuring adequate performance of the product under all conditions in which it will operate.

If a product is implemented using a concept that is not robust, it is vulnerable to attack, in the marketing sense, from a product which is more robust and efficient. The key to eliminating this vulnerability is to evaluate alternative concepts against good, comprehensive Measures in order to determine which concept will be able to provide the desired Benefits with the minimum effort.

### How do we develop Alternative Concepts?

There are several different approaches to identifying and defining Alternative Concepts. Each approach should be considered to ensure that you have examined a wide enough set of Alternatives.

Competitors are a great source of ideas for Alternative Concepts. Most products, which currently address the same set of benefits as your product, have probably taken slightly different design approaches. The team should examine each approach to determine whether the approach merits emulation or can be improved upon.

When the team asks its customers what they want in a product or service, the customers often respond in terms of solutions. While most of these solutions will be fairly obvious, there will probably be a few that you never considered. These few acorns can spawn some very good ideas. After all, the customers are working with the product on a frequent basis in the environment where the product really has to perform.

Management's ideas also need honest consideration. If management's ideas are not considered, in good faith, the team is setting itself up for a difficult time in getting their chosen concept approved.

The team itself should also spend some time dedicated to brainstorming some creative alternative approaches to providing the Benefits. One proven method is to assign each team member to identify one approach which they will champion during team discussions. In this way, the team is motivated to understand the ideas which they have brainstormed to a level of detail which makes it feasible to compare the alternatives.

The last approach to identifying and developing Alternative Concepts is the detailed analysis of the Design Measures to be used as selection criteria. The team evaluates how it could achieve the required Target Value for each Measure. A table is created with different design Concepts forming the columns and the approaches for each Measure forming the rows. For example, if we were identifying Alternative Concepts for a new watch, we might generate the following table:

Selection Criteria	Target Value	Concept 1	Concept 2	Concept 3
Number and Type of desired Alarms	3	Beep, Vibrate, Display Flash	Beep, Display Flash, Chime	Chime, Vibrate, Voice
Duration of Illumination	During all operations with two second decay	Slow decay LED Light	Backlight with wait circuit	Florescent watch face
Time to complete Standard Operations Suite	Maximum of 4 seconds	Single button menu	Dual button menu	Three button menu

The columns of this table would then be examined and rearranged by the team to identify a series of viable Alternative Concepts. Remember, only those alternatives able to achieve all of the target values are considered viable.

### How should we choose the best Concept?

The Concept that provides the required level of performance, most reliably and at the lowest cost is, by definition, the Best Concept. The Best Concept is identified by evaluating the Alternative Concepts against the objective Measures.

A widely accepted process for selecting the Best Concept, is a modification of the Selection Process developed by Stuart Pugh. This matrix oriented process uses the Measures as Selection Criteria against which the Alternative Concepts are evaluated. The team selects a Baseline Concept. A relative comparison is made between the Baseline and the other Concepts for each of the Selection Criteria.

If the Alternative Concept rates better than the Baseline, a Plus sign is entered into the cell at the intersection of the Measure's row and the Concept's column. Whereas, a Minus sign is entered, for those Alternative Concepts that rate worse than the Baseline. A Star is entered to indicate the two concepts have equivalent performance.

After the relative performance has been evaluated, the overall performance of the Alternative Concepts is calculated by using a weighted sum of the relationships. The relationships are weighted by the importance of the Selection Criteria.

Often, multiple iterations of this process are performed using different Baseline Concepts. An alternative way to select a Baseline is to identify the strong points of two or more concepts and create a new Super Concept. This can be a very powerful process!

The Capture software supports the Concept Selection symbol set and calculations. Select this symbol set when you create a new concept selection Matrix. For more information, please refer to "How to select a set of relationship symbols for a matrix" in "Chapter 6: Matrix How To's" and "Concept Selection Score" in "Chapter 10: Calculation Reference".

## Chapter 21: Defining Actions

### What should we do as the result of this QFD project?

One of the most common problems encountered by QFD teams is that they do not know what to do with the results of a QFD study. This is largely because they did not know what they wanted the study to do for them to begin with. To avoid this problem, it is wise to define up-front exactly what the team wants to accomplish with the QFD project. For example, a perfectly valid result is “to develop a comprehensive Product Specification and to select the Product Concept which would be most efficiently implemented.” If this were the objective of the team, then the appropriate Action is to develop a detailed design using the Product Specification and Concept as a guide.

A more rigorous approach would be to answer the question “What actions do we need to take to achieve the targets that we have set in order to satisfy our customers?” In QFD terms, the Measures and their Targets can form the Input List an Actions Matrix with the List of Actions forming the Output List. By defining the Relationships in this Matrix, the team is likely to identify all of the Actions required. The names of the people who are responsible to carry out each action can also be recorded.

In addition to the Actions needed to achieve Target Values, there is a whole class of Actions which deal with gathering information to ensure good decision-making during the QFD project. For example, if a team is working with Design Tradeoffs, it is quite common to find negative relationships between Measures. Since a Negative Relationship indicates compromise, an Action should be defined immediately that involves someone from the team investigating the relationship and how the team might get around it. Similarly, when the team is involved in Benchmarking the competition, someone on the team is usually assigned to gather the specific information the team is interested in. This whole class of Actions can be captured as an Actions Document within the Capture software. For more information, please refer to “Documenting the Project” in “Chapter 2: Getting Started Tutorial”.

## **Chapter 22: Glossary of Terms**

This section provides definitions of the terms found throughout this documentation.

### **Characteristics**

Characteristics are distinguishing traits, qualities, or properties.

### **Chart**

The traditional view of a QFD matrix containing rows, columns, relationships, data values and graphs.

### **Concept Selection**

A method of matrix analysis for the purpose of evaluating multiple product/service/strategy concepts against a baseline concept to determine the best-fit concept for the given requirements.

### **Critical to Quality**

Any aspect of a product or service that a customer considers important.

### **Decision Criteria**

Decision Criteria is a set of standards on which a decision will be based. It could also be called a set of requirements or "wants and needs" for a product, process or strategy.

### **Decision Measures**

Decision Measures are the measurable and controllable characteristics of a product, process or strategy that will determine how well the decision criteria are being met.

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## House of Quality

A term given to a single matrix QFD project that includes a “roof” for tradeoffs; customer assessments; benchmark assessments and target values.

## HOWs

HOW is the generic name for the List forming the columns of a Matrix. This is the set of information which has been translated from a set of WHATs that form the rows of the Matrix.

## Input List

A List forming the rows of a Matrix. Generally this is a set of customer wants and needs which must be translated into a more measurable, actionable list which will form the columns of the Matrix.

## List

A set of List Entries which answer a specific question. For example, the questions answered may be “What does our Customer Want?” or “How will we insure that we are meeting Customer Needs?” Lists form the rows and columns of a Matrix.

## List Entry

A component of a List. Forms the label of an Input row or Output column of a Matrix.

## Matrix

A Matrix defines the Relationships between two Lists. The Relationship Values within the Matrix are used to describe how the Output List relates to the Input List. The Matrix is the means by which the prioritized rows are translated or deployed into prioritized columns.

## **Output List**

A List forming the columns of a Matrix. The Entries in this List should be measurable and controllable in nature. Generally this is a set of information which has been translated from a set of requirements which form the rows of the Matrix.

## **QFD**

QFD is a method for systematically focusing all organizations in your business unit towards satisfying the requirements on your product, service or strategy which are most important to the customer.

## **Related Data Entry**

A set of data that is used to prioritize the List Entries. This data is either collected or derived and typically includes the current level of customer satisfaction, importance to the customer, and target (goal) values.

Related Data Entries appear as columns in the List window spreadsheet. If the List forms the rows of a matrix, then its Related Data Entries will appear as columns on the left or right side of the matrix relationships. If the List forms the columns of a matrix, then its Related Data Entries will appear as rows above or below the matrix relationships.

## **Relationship**

The intersection of Input rows and Output columns in a QFD matrix into which values, sometimes represented by a symbol, are placed. These values usually represent the answer to the following question: “If we do a good job of controlling the current Output Entry, how sure are we that we will meet the requirement of the current Input Entry?”.

## **Relationship Tree**

A format for viewing and adding Relationship Values in which all Relationships with a particular Input Entry are shown at one time. This allows you to evaluate the completeness of coverage of a particular requirement.

## **Requirements**

Requirements a set of standards on which a decision will be based. They are the "wants and needs" for a product, process or strategy.

## **Roadmap**

A graphical representation of the Documents, Lists, and Matrices included in a Project. The flow of data between the Lists and Matrices is shown by connecting lines.

## **Roof**

A roof on a QFD matrix is a triangular area that defines the interrelationships between the entries in a list. If there is a negative impact of one entry on the other, then a negative symbol will appear in the intersection between the two entries within the roof. If there is a positive impact, then a positive symbol will appear.

## **Six Sigma Process**

The Six Sigma Process is a rigorous analytical process for anticipating and solving problems. The objective of Six Sigma is to improve profits through defect reduction, yield improvement, improved consumer satisfaction and best-in-class product and process performance.

## **Template**

A Capture File which already has Lists, Matrices, Calculations and Graphs defined for common approaches to QFD. This is a “quick start” tool which avoids repetition of tedious Project setup tasks. Capture software comes with several industry-standard Templates. You may also create your own personal or organizational Templates based upon your approach to QFD Projects.

## **Weighting Factor**

A value that can be associated with each Related Data Entry. It is usually used to identify the relative importance of different customer groups to your business. The Weighting Factors for all customer groups should add to 1.0 (or 100%). This value will be used in the Weighted Average Calculation and can also be used in User Defined Calculations.

## **WHATs**

WHATs is the generic name for the List forming the rows of a Matrix. Generally this is a set of customer wants and needs which must be translated into a more measurable, actionable list which will form the columns of the Matrix.



# Index

## A

Actions.....	182, 183, 193
Analytic Hierarchy Process .....	181
Audit trail.....	116
Automatic Recalculation .....	95

## B

Basic Expectations.....	163
Benchmark.....	184, 185, 186

## C

Calculated row or column.....	63
Calculations .....	118
Reference.....	118
Categories .....	48
create in list.....	48
Characteristics (see also HOWs) .....	194
Chart .....	81, 83, 84, 87, 194
data areas to include .....	87
definition.....	194
print .....	83
save as picture.....	87
save as webpage.....	33, 84
view .....	81
zoom .....	90
Color Printing .....	95
Colors	
foreground and background of rows and columns.....	89
Concept Selection .....	192
Concepts .....	163, 189, 190, 191, 192
Concurrent Engineering.....	162
Customer.....	160, 168, 170, 171, 173, 176, 178, 179, 184, 187
customer groups.....	164, 165
Customer Importance .....	169
Customer Requirements .....	165, 175, 177, 179
Customer Satisfaction.....	167, 184

Customers .....	164, 166, 168, 172, 175
Perception .....	166, 167
<b>D</b>	
Data type .....	62
set .....	62
Decision Criteria .....	194
Decision Matrix .....	195
Decision Measures .....	194
Design Alternatives .....	178
Design Concepts .....	163, 189, 190, 191, 192
Design Measures .....	175, 177, 179, 182, 184, 187, 190
Document .....	193
<b>E</b>	
Enter key Movement .....	96
Error Messages .....	156, 157, 158
Error loading from file Message .....	158
Not enough disk space on install .....	156
Undefined Error Message .....	157
<b>F</b>	
Font .....	96
<b>G</b>	
GOAL/QPC .....	161
Graph .....	64
setup for chart .....	64
<b>H</b>	
House of Quality .....	182
HOWs .....	195
add .....	23
definition .....	195
prioritizing .....	27
sort .....	28
HTML output .....	33, 44, 84
<b>I</b>	
Importance to the Customer .....	166
Improvement Factor .....	169, 170, 174
Input List .....	180, 181
International TechneGroup, Inc. ....	162
ITI .....	162

**L**

List.....	38, 47, 48, 50, 163, 166, 167, 168, 173, 174, 176, 177, 188
add .....	38
add entries.....	13, 47
categories .....	48
create.....	48
change name of .....	47
create .....	46
sort .....	22, 28, 50
List Entry .....	180, 195
add .....	47
definition.....	195
delete .....	51
exclude from chart .....	53
move .....	51

**M**

Market Data .....	164
Market Opportunity Map.....	98
create .....	98
Market Research.....	159, 163, 166, 167
Matrix .....	39, 72, 74, 78, 160, 163, 165, 177, 178, 179, 180, 192
add .....	39
add relationships .....	74
create .....	72
setup relationship symbols.....	78
Matrix of Matrices .....	161
Maximum .....	173
Measures	
Good .....	176
Types .....	176
Merge team results.....	111
Move boxes .....	40
on the roadmap .....	40
Move lines .....	41
on the roadmap .....	41

**O**

Open .....	35
template file .....	35
Output List.....	178, 180, 193

**P**

Percent .....	169, 170, 171, 174, 176
Picture.....	87

save chart as picture.....	87
Print .....	44, 83
chart.....	83
in color.....	95
roadmap.....	44
Pugh Concept Selection.....	191

## Q

QFD.....	159, 162, 165, 169, 173, 175, 180, 184, 187, 193, 196
Approaches.....	160
Tools.....	163
Why use it.....	159
QFDcapture .....	98
Quality Function Deployment .....	159

## R

Related Data Entry.....	196
add .....	55
add notes.....	55
change name .....	57
change properties.....	60
copy .....	58
cut.....	58
exclude from chart.....	70
move .....	60
paste.....	59
paste insert.....	59
set data type of.....	62
set symbols for.....	66, 67
Relationship symbols.....	78
setup for matrix.....	78
Relationships .....	177, 179, 180, 182, 193, 196
add in spreadsheet view .....	25, 74
add in tree view.....	75
definition.....	196
delete in spreadsheet view .....	76
delete in tree view.....	77
Scale of Values used.....	180
setup symbols for.....	78
symbols used .....	78
Requirements	
Prioritizing.....	168
Requirements (see also WHATs) .....	197
Roadmap.....	38, 40, 41, 163, 197
definition.....	197
house of quality view.....	96

move boxes.....	40
move lines.....	41
save as web page.....	44
setting box size .....	43
Roof.....	73, 197
create .....	73
definition.....	197

## S

Sales Factor .....	172
Setup.....	63
calculated row.....	63
Shift Right .....	48
Show Category Level Marks .....	48
Sort .....	22, 28, 50
list.....	50
the HOWs.....	28
the WHATs.....	22
Spell Check.....	91
Spreadsheet View .....	179, 180
Startup Template.....	95
Strategy.....	171, 187
Survey.....	107
generate.....	107
Symbols.....	66, 67, 78
setup custom symbol set for a matrix .....	78
setup for matrix.....	78
setup for related data column or row .....	66

## T

Target Satisfaction Ratings.....	16
target values.....	191
Target Values.....	32, 187, 193
Template file.....	35
definition.....	198
open .....	35
templates included with software .....	35
Tradeoffs.....	29, 182, 187, 193
Tree diagram.....	103

---

**W**

Web page.....	44, 84
of chart.....	33, 84
of roadmap.....	44
Welcome to online help.....	7
WHATs .....	198
add .....	13
definition.....	198
enter importance values for .....	14
enter satisfaction ratings for.....	15
sort .....	22
Window Background Colors .....	96

